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The Walter and Inger Rice Center for Environmental Through Time: A Study in Environmental Change, Human Land Use and its Effects along the Lower James River

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The Walter and Inger Rice Center for Environmental Life Sciences Through Time

A Study in Environmental Change, Human Land Use and its Effects along the
Lower James River

Submitted to the Virginia Commonwealth University in partial fulfillment
of requirements for a Master of Environmental Studies

May 2009

Chris Egghart

Foreword

When this thesis project was first envisioned, its scope was limited to chronicling the effects of historic human land use along the Lower James River using the Virginia Commonwealth University Rice Center for Environmental Life Sciences property as a case study. However, in conducting background research and compiling data for the undertaking, the author came to fully appreciate the extent to which natural occurring and culturally induced environmental change are interconnected. For this reason, the charting of the natural changes in the local environment should be considered not only as providing the textual framework for the study but also an integral component thereof. In this work, cartographic sources, historic accounts, and ethnographic and archaeological data help reconstruct past settlement patterns and land uses that together acted to shape the changing cultural landscape of the Lower James River. This cultural landscape represents the most obvious expression of human influence over the local environment. Other impacts are more subtle but environmentally significant nonetheless. In charting past impacts to the Lower James River environment, the study gives equal consideration to Native American and European land use practices. Native American environmental impacts, however, while not insubstantial at the time they were incurred, have generally not persisted. This is due not only to a lesser intensity of land use during prehistory and the time that has elapsed, but also to the fact that most impacts stemming from Native American activity were likely erased by the wholesale environmental degradation associated with initial European settlement. Research for this project yielded an unanticipated dividend in the form of detailed insight into the local cultural landscape of the Antebellum period. A Civil War era military map depicting the strategically critical Lower James River below Richmond provided a detailed view of mid-nineteenth century land use and settlement of the Rice Center and surrounding areas. In addition to showing individual structures including quarters associated with larger manors, the map also indicates the race of some of the dwellings' inhabitants. With such level of detail, close examination of the map offers an unparalleled view of the local cultural geography during the mid-19th century. While fascinating in its own right, this cultural geography and the historical landscapes that are its expression, are key to understanding the whole of the human impacts to the local environment through much of the historic period.

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Section 1 Introduction

As the 21st century begins, mankind faces a daunting array of environmental challenges. Global industrialization, urbanization, and population growth have dramatically changed the face of the planet. Major environmental liabilities stemming from these processes include pollution, deforestation, desertification, the spread of non-native species, and plant and animal extinctions. The specter of man-caused or enhanced global climate change is also of significant concern. However, with the exception of problems specific to large scale industrial pollution, the environmental issues facing us today are manifestations of processes that have been ongoing for millennia. Humans have been modifying, altering, and otherwise influencing their environment for as long as the modern species has existed.

As the primary avenue for the early English settlement of North America, much has been written on the history and archaeological record of the Lower James River. However, very little research pertaining to the cultural ecology of the area has been undertaken. Studies that have been performed typically focused on a particular time frame in the context of specific archaeological research issues. What is lacking is a synthetic view of the environmental changes that occurred during the ca. 11,500-year span of human occupation of the Lower James River, and the role that humans played in shaping those changes. This work seeks to provide such a view.

The study focuses on the Virginia Commonwealth University Walter and Inger Rice for Environmental Studies (Rice Center), located in Charles City County along the north bank of the James River between Richmond and Williamsburg. First presented is a baseline description of the present day condition of the Rice Center property. This is followed by a detailed account of the physiographic and ecological changes that occurred along the Lower James River since the end of the Pleistocene. A cultural context section summarizes the prehistory and history of the Rice Center setting from when humans are first known to have arrived approximately 11,500 years ago through present day. Land use and land use impacts are then analyzed within the chronological/cultural units detailed in the cultural context section. This information is synthesized and applied to a time line reconstruction of the Rice Center environment. While the naturally occurring changes to the Lower James River setting are detailed, emphasis of this study is on how human land use helped shape the Rice Center environment through time.

Section 2 Organization and Methods

Introduction

In its Lower James River setting, the Rice Center is an excellent candidate for a study in human land use and its impacts. Over the past 11,500 years, the Lower James River has gone through a profound physical transformation as a result of Holocene climate shift and resultant sea level rise. This physical transformation and accompanying ecological changes helped shape prehistoric settlement and other life ways of the area. Native Americans in turn, left a mark on the natural environment on which they depended. The Lower James River was also a focal point of early English settlement. The first century of English land use resulted in extensive deforestation and soil exhaustion wrought by tobacco cultivation. The area was then subjected to an additional 300 years of historic land use impacts, including the localized but dramatic environmental effects of Civil War related activities.

A stated goal of the study is to chart the cultural impacts to the local environment with the aim of establishing how these impacts shaped the present day Rice Center. To achieve this, historic settlement and land use patterns of the Lower James River are detailed. The study also seeks to directly chart historical land use on the Rice Center itself. Of particular utility in this regard is a highly detailed Confederate Engineering Bureau (Gilmer 1863) map of the James River that shows the Rice Center property. This map exhibits an astonishing level of detail, including land use renderings, that is virtually unheard of in mid-19th century cartographic sources. While most Virginia counties east of the Blue Ridge were mapped by the Confederate Engineering Bureau, few of the documents have fully comparable detail. The Confederate Engineering Bureau map is not only the oldest viable cartographic source available to this study but also has a level of detail not matched for the location until publication of the first USGS 7.5 minute quad early in the 20th century.

In referencing and interpreting the Confederate Engineering Bureau, the assumption is made that the land uses it illustrates are a reasonable approximation of those dating as far back as the rise of the Tidewater Plantation system in the early to mid-18th century. This assumption is predicated on soil properties of local soils in terms of agricultural suitability, and broad characterizations of local land use trends within the social and economic systems operative during the second half of the colonial period. Stated otherwise, at some point following the tobacco boom, local land use patterns are thought to have achieved a relative stasis. Under these conditions, prime agricultural lands remained in production throughout the colonial period (and through to present day). On the other hand, more marginal land was likely abandoned to agricultural use shortly following the tobacco boom years. These land use patterns are thought to have remained largely unchanged through the balance of the colonial era and continuing on through the first half of the 19th century. In addition, it is thought that as a property associated with major James River plantations, the Rice Center lands were part of effectively managed agricultural enterprises and were thus further unlikely to have been subjected to gross changes in use (e.g. cropland, grazing/pasture, forest/woodlot) for perhaps a century and a half or more before the Confederate Engineering Bureau map was drawn.

More uncertain is the use history of intermediate quality agricultural land along the Lower James. These lands may have remained in production, being worked either by tenant farmers or small to middling property owners. One can expect there to have been a long term trend by which intermediate to marginal land was abandoned to agricultural use over time. Nonetheless, in addition to portraying the Lower James River landscape at onset of the Civil War, the Gilmer map is seen as providing at least a rough depiction of the local cultural landscape as far back as the mid-18th century.

The greatest changes in local land use, other than initial forest clearing of the early 17th century, likely occurred immediately following the Civil War. Factors seen as precipitating these shifts include: 1) the bankruptcy and breakup of the major plantation holdings following the Confederate defeat; 2) emancipation of the slave population; 3) resource demands associated with the rebuilding of nearby Richmond and its rapid industrialization/population growth during the following decades; and 4) the advent of essentially modern agricultural systems in the early 20th century. In this context, the 1863 Confederate Engineering Bureau map also provides a benchmark for charting the rapid changes following the Civil War and leading to the rise of the modern era.

In further attempting to reconstruct early European land use, a second assumption is made that during initial James River settlement in the early 17th century, the Rice Center terraces were subjected to wholesale land clearing for tobacco monoculture. This is a reasonably safe assumption as most arable James River fronting lands in the immediate area were subjected to this particularly destructive form of land use during the early colonial era tobacco boom. Study of this period in Virginia history presents definitive challenges associated with a paucity of documentary sources. For this reason, early colonial settlement and land use of the study area is broadly inferred based on recognized historical trends, the distribution of known archaeological sites in the vicinity of the study area, and consideration of physiographic properties specific to the Rice Center location. Inferences on Native American use of the Rice Center lands are similarly based.

Organization

The study is organized as follows. First presented in Section 3 is a detailed physiographic and environmental description of the contemporary Rice Center property. Included are reviews of the location and setting, a breakdown of constituent landforms, soil descriptions, current land use, and a detailed account of the existing vegetative cover and plant communities. This information establishes the baseline condition of the Rice Center environment against which changes can then be charted over time.

Section 4 summarizes the geological, climate, and ecological history of the Lower James River setting. The section details the naturally occurring changes in the area, beginning with the height of the last glacial maximum and continuing on through the modern era.

The culture history of the Lower James River is synopsized in Section 5. This account, which covers the prehistoric period, the historic period, and modern times, provides the context within which human settlement, land use, and land use impacts are analyzed.

Section 6 details the actual human settlement and land use in the study area. For the prehistoric period, Native American settlement and land use is analyzed in the context of the immediate Lower James River setting, with inferences made in regard to human land use within the Rice Center property itself. Limited archaeological data pertaining directly to the Rice Center land is also incorporated into the analysis. For the historic period, settlement and land use activities are summarized within two subsections; the first addressing the Lower James River setting as a whole, followed by a reconstruction of activities specific to the Rice Center, as best available sources allow.

Section 7 presents an analysis of local environmental impacts directly resulting from these activities. Land use impacts resulting from Native American activities are first analyzed, followed by an accounting of the far more substantial and lasting impacts of the historic period. The effects of human activities are portrayed in the context the Lower James River setting as a whole, focusing on the Rice Center in particular, as appropriate.

The data presented in the natural history/cultural history, settlement and land use, and land use impacts sections are synthesized in Section 8 in order to arrive at an interpretive reconstruction of the Rice Center from the late Pleistocene through modern day. While the naturally occurring changes on the property are detailed, emphasis is on how human use has helped shape the landscape of the Rice Center through time.

In conclusion, Section 9 analyzes the sum of human impacts to the present day Rice Center in terms of how these impacts may be expressed in the contemporary local environment.

As the Epilogue, Section 10 briefly contrasts contemporary conditions to what the Rice Center environment might have looked like had it never been touched by human hand. It also postulates what a future Rice Center environment may look like, given the property is now preserved in perpetuity.

Throughout the study, data and analyses are organized in chronological/cultural order, with the prehistoric (Native American) and historic (Euro-American) periods representing the primary division. The prehistoric period is further broken down by sub-periods commonly employed by archaeologists working in Middle Atlantic region. The historical period is also subdivided within logically defined eras, beginning with the founding of Jamestown in 1607, and continuing through to the present day. Table 2-1 lists the cultural/temporal divisions used throughout this work.

Table 2-1 Cultural/Temporal Divisions

Prehistoric	
Paleo-indian	9,500 – 8000 B.C. (11,500-10,000 BP)
Early Archaic	8,000 – 6,500 B.C. (10,000-8,500 BP)
Middle Archaic	6,500 – 2,500 B.C. (8,500 - 4,500 BP)
Late Archaic	2,500 – 1,100 B.C. (4,500 - 3,130 BP)
Early Woodland	1,100 – 500 B.C. (3,100-2500 BP)
Middle Woodland	500 B.C.- A.D. 1000
Late Woodland	A.D. 1000 - 1607
Contact Period	A.D. 1607 – ca. 1644
Historic	
Jamestown and the Virginia Company	1607-1624
Early Colonial Period	1625-1699
Colonial Golden Age	1700-1775
American Revolution and Federal Period	1776-1819
Antebellum	1820 -1860
Civil War and Reconstruction	1861-1880
Dawn of the Modern Age	1881-1899
Early 20 th Century	1900-1929
Great Depression and World War Two	1930-1945
Modern	1946- Present

Data Sources and Section Focus

The natural history of the Rice Center is detailed by drawing on a number of academic studies specific to the Lower James River and the Chesapeake region as a whole. The cultural history sections, particularly the portions detailing the Native American and Early Colonial period settlement, cite synthetic archaeological and ethno-historical works specific to eastern Virginia. Also drawn upon is a significant body of local archaeological research, including that which the author actively engaged in as a staff member of a former, Virginia Commonwealth University-based cultural resource management consulting organization. Post colonial period settlement and land use patterns are summarized in terms of general historical contexts. Reconstruction of land use specific to the Rice Center property relies on primary historical sources as well as inferences based on recognized historical trends for adjacent James River environs.

The principal data sources for Section 4 through Section 7 are summarized below.

Geological, Climatological and Ecological Context (Section 4)

Section 4 synthesizes the natural history of the Lower James setting. The most pronounced changes to the study area resulted from rising sea levels that transformed the Lower James River from a free flowing river contained within a narrow channel, to a broad tidal estuary. This study draws on a wealth of data applicable to the Holocene Lower James River setting. Holocene sea level curves have been generated by Kraft (1977) for the Delaware Bay. More recently, Colman,

Halka and Hobbs (1991) published a study specific to the Chesapeake region. Sediment profiles obtained from borings in the Baileys Creek bed in eastern Henrico County (Johnson and Peebles 1983) help to chronologically define the embayment of the Lower James in the vicinity of the Rice Center. Also drawn upon in the reconstructive examination of the Lower James are detailed sedimentological and palynological studies undertaken in analogous Atlantic Coastal Plain riverine settings such as the St. Mary's River in Maryland (Kraft and Brush 1981), the St. Jones River in Delaware (Brush 1994, Rogers and Pizzuto 1994) and the Savannah River (Brooks et al. 1996).

Climate change also played a major role in shaping the Lower James River environment through time. The major climatic shift that brought about the end of the Last Wisconsin glaciation and associated ecological changes are reasonably well documented in a continental context. Significantly more difficult to achieve is a finer-grained understanding of the climatic trends and oscillations that have been ongoing since the end of the Pleistocene, particularly on a regional scale. These climatic conditions played a key role in shaping the ecological profile of the study area. Holocene climate studies in the Middle Atlantic have typically relied on pollen records. Carbone's (1976) application of pollen data in regional climate reconstruction is the work most often cited by archaeologists. Whitehead's (1972) Dismal Swamp pollen data are largely applicable to the Lower James River study area. More recent dendrochronological studies by Stahl et al. (1998) on bald cypress stands along the Nottoway River shed light on climate conditions and episodes in eastern Virginia during the late prehistoric and early colonial times.

Also to be examined is archeological evidence for changes in climatic and ecological conditions. This is done by reviewing carbonized tree/plant remains recovered from archaeological contexts (Delcourt et al. 1986, Stevens 1991, MacAvoy and MacAvory 1997). Additional archaeological data are examined for evidence of aeolian (wind blown) soil deposition as it may relate to changing climatic conditions (Curry 1980; Custer 1994; Grant et al. 1998).

Cultural Context (Section 5)

Archaeologists and historians working in the Lower James River area have the good fortune of being able to tap a large body of primary historical sources describing Native American life ways at the time of European contact. In many parts of the eastern United States, Native American populations were decimated by disease and warfare before their cultures could accurately be chronicled. By contrast, detailed observations of eastern Virginia Native life were recorded by Captain John Smith (1886 [1624]), William Strachey (1953[1610]), and other early explorers. These accounts and other period sources have been compiled in several excellent ethno-historical narratives detailing aboriginal life ways in Eastern Virginia during the early 17th century (McCary 1978, Roundtree 1989, 1990, Roundtree and Davidson 1997). Roundtree's (1989) ethno-historical synthesis of the Powhatan Confederacy of eastern Virginia is a particularly useful compilation of Native life ways at the time of European contact.

Ethno-historical sources describing early 17th century Native America is augmented by archaeological data from protohistoric period excavations at Jordan's Point (Mouer et al. 1992, McLearn and Mouer 1993, 1994), located across the James River from the Rice Center and at Governor's Land at Two Rivers (Hodges and Hodges 1997), situated near the mouth of the Chickahominy. Reconstructions of Native American life ways in earlier times must rely on archaeological data alone. Major recognized trends in prehistoric life ways are briefly discussed

in the context of the broader Middle Atlantic regional archaeological literature. Dent (1990), in particular provides a good archaeological overview of the prehistoric Chesapeake. Potter's (1993) work along the Virginia side of the Lower Potomac details changes in prehistoric life ways over the last 3,000 years. Although in a different coastal river system, the cultural changes in the Potomac valley are seen as roughly analogous to the Lower James setting. These sources are augmented by time period-specific archaeological overviews of prehistoric settlement and life ways in the Virginia Coastal Plain (Egloff and MacAvoy 1990, MacAvoy and MacAvoy 1997, McLearen 1991, 1992, Turner 1992).

A significant number of prehistoric encampment-type sites have been investigated along interior, low and intermediate order James River and Appomattox tributary streams situated in proximity to the Rice Center (Mouer et al. 1980, Mouer 1986a, Mouer 1986b McLearen 1987, Egghart 1989). These settings are nearly identical to the interior portions of the Rice Center property along Kimages Creek. Sites in similar settings have also been investigated along minor Lower James tributaries in James City County near Williamsburg (Hunter et. al 1993, Gallivan and Blouet 2001).

For the historic period, a brief review of the early English settlement of the Lower James River is provided, as well as a brief historical narrative outlining the area during 18th, 19th and 20th centuries. Also provided is an overview of the settlement patterning and cultural geography of the early historic Lower James River. This overview draws on studies of early colonial settlement patterns studies that review English settlement patterns in physiographic, ecological as well as economic contexts (Deetz 1993). Also discussed is archaeological data pertaining to the early settlement and land use in settings analogous to the Rice Center property.

Settlement and Land Use of the Rice Center (Section 6)

The review of past human land use is presented in two sections: Native American (prehistoric and contact periods) land use practices and impacts, and Euro-American practices of historic times. Native American land use during the time of European contact is summarized by drawing on the same ethnohistorical and archaeological sources used in the culture history section. Prehistoric cultural factors addressed include changing group size, movement/migration, advent of sedentism and adoption of horticultural subsistence practices. European settlement and land use practices are detailed within the context of historic trends in the Lower James River beginning with the establishment of Jamestown in 1607. Major historic land use trends that are certain to have environmentally impacted the study area include widespread land clearing for 17th century tobacco cultivation, the consolidation of James River fronting lands into large 18th century plantations holdings, 19th century agricultural regimes, and 20th century suburban encroachment. Also addressed are effects of Civil War related activities and rapid growth of Richmond and surrounding areas during the late 19th and early 20th centuries. In addition the Gilmer (1863) military map, sources that are engaged in reconstructing later historic period settlement and land use includes mid-20th century USGS maps, pre-World War Two air photos, late 19th century James River navigation charts and Civil War era photographic images of the nearby James River environs.

Environmental Impacts to the Study Area (Section 7)

Settlement and land use data presented in the previous sections are analyzed in terms of its impact to the local environment. While prehistoric environmental impacts pale in comparison to those of the historic period, Native American's mark on the landscape was not inconsequential. Examined in Section 7 are the effects to local vegetation on Native American occupation sites, the use of fire to drive game, and the clearing of areas for cultivation. Also assessed is the potential for the purposeful modification of the climax forest cover to promote or maintain succession plant communities. Historic period landscape/ecological impacts examined include those related to agriculture, particularly the destructive impacts of early tobacco monoculture, deforestation, erosion and stream/riverbed, the introduction of non-native plant species, and soil exhaustion. Also detailed are the localized but destructive environmental impacts of Civil War related activities. Historical land use impacts are also examined as they relate to burgeoning industrialization and growth of late 19th and early 20th century Richmond. Analysis of land use impacts to the Rice Center include those of modern times leading up to the property's acquisition by Virginia Commonwealth University.

Section 3 Location, Physiographic Setting, and Present Day Condition

Introduction

Section 3 provides a detailed description of the Rice Center location, physiographic setting and physical condition. The three part section begins with an account of the Rice Center's location and geographic context, including a sketch of the modern day James River. This is followed by a detailed accounting of the Rice Center's setting and constituent physiographic features. The third subsection provides a synopsis of the property's contemporary baseline environmental condition.

The Rice Center Location

The Rice Center is located on the north bank of the tidal James River, just east (downstream) from the mouth of the Appomattox River. The property lies approximately 15 miles east of the Richmond city limits and 27 miles west of Williamsburg. Route 5, a scenic and historic byway that connects the two cities, marks the northern limits of the Rice Center tract. The southern edge of the property fronts the James River shore. In its riverside location, the Rice Center is situated between Shirley Plantation and Berkley Plantation, arguably some of the most historical properties in the region. Much of the Rice Center riverfront consists of high bluff that affords a sweeping river vista. Kimages Creek, a low order tributary to the James, cuts through the western third of the property on an approximate north-south axis. An unnamed low order stream defines the Rice Center's western limits. The mouth of Kimages was impounded to form Lake Charles, which originally covered approximately 70 acres. In total, the Rice Center encompasses 343 acres.

Physiographic Setting

The Rice Center lies within the Inner Coastal Plain of Virginia. Local topography is typical of the James River Coastal Plain below Richmond, with broad upland terraces intermittently dissected by low order streams. Relief is minimal, except along the entrenched stream courses and river-facing bluffs. Terrace elevations are between 25 and 50 feet above mean sea level. Within Rice Center proper, maximum elevations are between 25-30 feet. These uplands are nearly level and the surface contour varies only slightly across the broad terrace tops. By contrast, the terrace edges fall sharply to the stream bottoms, while portions of the James River shore form a steep bluff.

The James River is by far the most prominent natural feature associated with the Rice Center. The river defines the physical character of the Rice Center setting, and its presence has shaped the natural and cultural history of the area. As such, the James River warrants a more detailed review.



Figure 3-1a Location of Rice Center Along the James River



Figure 3-1b Rice Center
James River
Setting

(looking southeast down river)



Figure 3-1a Location of Rice Center Along the James River (above)

Figure 3-b Air View of Rice Center Looking Southeast (below)



The Modern James River

While not as large as the Hudson, Susquehanna, or Delaware to the north, the James is one of the largest rivers on the eastern seaboard. From its headwater reaches in the mountains of far western Virginia, the James River flows approximately 330 miles across the state to meld with the Atlantic waters near the mouth of the Chesapeake Bay. Collectively, the river and its tributaries drain approximately 10,000 square miles or 6.4 million acres, making the James the largest tributary to the Chesapeake Bay estuary, other than the main stem of the Susquehanna and the Potomac. The James River can be divided into three segments based on the physiographic province through which it flows. These sections are herein referred to as: 1) the Mountain Headwaters; 2) the Piedmont Section; and 3) the Lower James.

The Mountain Headwaters lie in the Ridge and Valley physiographic province along the Virginia-West Virginia border. Much of this area is rural highlands. Valleys in the region see some agricultural use, while the mountain ridges are forested. The James River proper is formed by the confluence of the Jackson River and the Cowpasture River below Clifton Forge. From Clifton Forge, the James flows eastward, breaking through the Blue Ridge near the town of Glasgow.

East of the Blue Ridge, the Piedmont Section meanders within a broad floodplain flanked by rolling uplands. Land use along the river is predominately agricultural, and much of the floodplain is under intensive cultivation. The Rivanna River and the Rockfish River are the major Piedmont tributaries. The Fall Line, which is roughly paralleled by Interstate 95, marks the interface between Piedmont and the Coastal Plain physiographic provinces. The James River crosses the Fall Line in Richmond, cascading down a series of rapids and drop-offs, much of it within the city limits. Here James River descends 98 feet over a distance of approximately nine miles. This stretch is known as the Falls of the James.

Below the Falls, the James River comes under tidal influence. This segment is referred to as the Lower James. Between Richmond and Hopewell, the Lower James lies within a relatively narrow channel. From the base of the Falls the river follows a relatively straight channel due south before entering a series of meander loops. The major tributaries to the Lower James are the Appomattox and the Chickahominy. East of Hopewell, the James widens into an expansive tidal estuary. This area also marks the beginning of fresh-brackish water transition zone. Land use in this part of the Lower James is characterized by a mix of farms, forest, and residential development. Hopewell, located near the confluence of the James and Appomattox, is an industrial center and the site of several major chemical plants. The York River runs north, and roughly parallel to much of the Lower James. These two rivers define the Virginia Peninsula. At the end of the Peninsula, the James River meets the Chesapeake Bay, forming the world class port of Hampton Roads.



Source: Commonwealth of Virginia VMBP Database

Figure 3-2 2002 Air Photo of Rice Center

Figure 3-2 shows the Rice Center ca. 2002. The most prominent feature is the Kimages Creek impoundment forming Lake Charles. The photo was flown during the winter which easily allows one to differentiate between deciduous and evergreen forest cover. The most obvious feature is eastern side of the property that was timbered and planted in pine in 1977. In addition, the former agricultural field on the western terrace also shows in the photo as high density of pine trees. Pine is also prevalent along Terrace Slope facing the unnamed tributary as well as the along the Lake Charles shore.

The Lower James

The Lower James River can be divided into three sub-sections. These roughly correspond to the Inner Coastal Plain, Middle Coastal Plain and Outer Coastal Plain sub-divisions of the Virginia Coastal Plain physiographic province. For the purposes of this work, the Inner Lower James is defined as lying between the base of the Falls and the mouth of the Appomattox. The Middle Lower James lies between the mouth of the Appomattox and Jamestown Island. The Outer Lower James consists of the remaining section of the river leading to the Chesapeake Bay.

Inner Lower James

From the base of the Falls, the Inner Lower James River runs due south parallel to the Fall Line for a distance of approximately eight miles. Here the river is contained within a relatively deep and well-defined channel. The James then begins a serpentine course following a series of pronounced meander loops. Several of these loops have been bypassed through the construction of navigation cut-offs. The original meander loops remain connected to the cut channels. These old channels exist as tidal backwaters that have been subjected to extensive silting and infilling. The surrounding landforms consist of high, nearly level Coastal Plain terraces. Elevations center around 50 feet. Significant bluffs occur where the meandering channel has cut into these terraces. On the north side of the James, drainage of the surrounding uplands is by low order streams that trend north-south. These streams include Cornelius Creek, Roundabout Creek, Baileys Creek, and Turkey Island Creek. Terraces on the opposite (south) side of the James front the Fall Line. Drainage patterns are more complex than on north side of the river, and area is divided between the James and the Appomattox watersheds. A denritic pattern of low order streams prevails, with a majority of uplands between Richmond and Hopewell falling within the Appomattox River watershed. The Inner Lower James is purely fresh water. However, the entire stretch up to the base of the Falls is under tidal influence.

Middle Lower James

East of the Appomattox confluence, the James River widens considerably. The river course is also relatively straight, partially as a result of the meander bends having been inundated by Holocene sea level rise. Tar Bay, located just below Jordan's Point opposite the Rice Center, is an obvious example of such a drowned meander bend and its outer edge is clearly expressed in the modern estuary shoreline. River width along the Middle Lower James ranges between three quarters mile to one and one half miles. The topography and drainage patterns on the north side of the river are very similar to those upstream. Elevations of the river facing uplands range from 25 and 50 feet. Some relief is present across these terraces, and minor bluffs occur along the outside of major river bends. Drainage of these uplands is again characterized by low order streams that run north-south to empty directly into the main body of the James. By contrast, streams on the south side of the river tend to be of higher order. Intermediate order streams draining the south side of the James include Powell Creek, Wards Creek, and Upper Chippokes Creek. Portions of these streams are bordered by extensive wetlands and their mouths are embayed as tidal coves. In these same areas, headwater reaches of the Blackwater River extend to within a few miles of the James River shore. The Blackwater is part of the greater Carolina Sounds watershed, and the Chesapeake-Carolina Sounds drainage divide closely parallels the

southern bank of the James. The Chickahominy River is the largest tributary to the Middle Lower James. The Chickahominy, commonly known as the “Chick” is a sluggish Coastal Plain river bordered by expansive freshwater wetlands. From its headwaters at the Fall Line around Richmond, the Chickahominy flows due east, bisecting the Virginia Peninsula lengthwise, before turning south and meeting the James a few miles upstream from Jamestown Island.

Outer Lower James

The delineation between the Middle and Outer Coastal Plain of Virginia is fairly distinct. In the vicinity of Yorktown, terrace elevations abruptly drop to around 10 feet or less, clearly demarking the transition to the Outer Coastal Plain. In contrast to Middle Lower James, topographic relief is almost non-existent, even along the river shores. Most tributary drainages are embayed a considerable distance inland and tidal wetlands are common along all but the lowest order streams. Most of the Outer Lower James River is brackish while salinity at the mouth of the James approaches that of the open ocean. On the north side of the river, the Virginia Peninsula narrows to less than ten miles. This area is drained by short and sluggish low order streams. The Nansemond River and Elizabeth River are major James tributaries on the south side. Virtually the entire lengths of both these rivers are embayed, and their interior headwater branches border the Great Dismal Swamp.

Hydrology

As previously described, drainage patterns on the Rice Center and the surrounding area are characterized by low order streams that flow directly into the main body of the James. A deeply entrenched, unnamed drainage defines the western boundary of the Rice Center. Kimages Creek, a more substantial drainage runs north-south through the western third of the property. This stream was formerly impounded to create Lake Charles. Two short, intermittent streams branch eastwards from the former lake. Most streams in the area are fed by groundwater discharge and therefore have relatively consistent, if only minor water flow. Surface soils on the upland terraces are well drained. Consequently, surface water is rare in these locations. Seeps and other groundwater discharge points can occur at the base upland some slopes or where stream headwaters interface with the uplands. While the uplands are generally well drained, the low stream bottoms tend to be blanketed with fine-textured alluvium. As a result, stream margins are often saturated and typically support minor wetlands. Along some James River terraces in the vicinity of the Rice Center, the surficial aquifer is relatively shallow. In some instances, ground water is perched on a semi-impervious substrate comprised of Miocene period marine clays and marl, resulting in localized occurrence of isolated wetlands. On the Rice Center proper, west of Kimages Creek, the deep ground aquifer lies approximately 200 feet below grade as indicated by excavated late historic/early modern well depths (Virginia Geotechnical Services 2001).

Soils

Soils across the upland portions of the Rice Center are fine-textured and dense. Clay particle composition ranges between 40 and 80 percent (Virginia Geotechnical Services 2001). The primary upland soil unit mapped in the Natural Resources Conservation Service Soil Survey of Charles City County (USDA 2006) is Peawick Silt Loam (Figure 3-3). These soils, which are prevalent across the Rice Center uplands, are only moderately well drained. Some poorly drained areas occur on some level uplands. According to the USDA survey, Peawick Silt Loam

is not considered prime farmland. The soil is not suited to cereal crops but can support very good pasture. Peawick Silt Loam is also prone to deflation and compaction. Other upland soil units include Yeopin Silt Loam and Douge Silt Loam. These soils, which occur only in few small areas of the Rice Center, are very similar to the Peawick soils. The primary difference is that the latter are identified as prime farmland. Soils on the terrace slopes are of the Nevarc-Remlik Complex. These soils have a sandy loam surface horizon that quickly transitions to a clay loam. They typically occur on slopes of between 10 and 15 percent, which tends to increase surface run off, erosion and nutrient loss (USDA 2006). The stream bottoms are mapped as Bibb Fine Sandy Loam. Significant variation is present within this unit. Minor stream terraces resulting from overbank deposits are comprised of sandy loam. Pebble and cobble beds representing old stream channels also occur. Lower lying areas that collect floodwaters contain much finer, silt-textured soils. The James River shore is characterized by sand and gravel beach deposits that are actively being reworked by tide and wave action. A brief synopsis of the major upland terrace soils units as defined in the USDA Charles City County Survey (2006) is provided below.

39 A and 39 B Peawick Silt Loam (Major unit)

- Silt loam grading to silty clay subsoil
- Developed from clayey alluvial sediments
- Moderately well drained with high, perched water table
- Poorer drained depressions in 39 A (0-2 percent slope)
- Not prime farmland but well suited for pasture; grass-hay-legume production

51 B Yeopin Silt Loam (Minority occurrence)

- Silt loam grading to silty clay loam subsoil
- Developed in loamy and silty alluvial sediments
- Moderately well drained with high, perched water table
- Prime farmland and well suited for corn, wheat, and grass-legume-hay production

18 B Dogue Silt Loam (Minority occurrence)

- Silt loam grading to clay subsoil
- Developed from clayey alluvial sediments
- Moderately well drained with high, perched water table
- Poorer drained depressions
- Prime farmland and well suited for corn, wheat and grass-legume-hay production



Limited archaeological testing was carried out on the Rice Center by the William and Mary Center for Archaeological Research (Monroe 2006, 2007). Soils documented in the archaeological work were perhaps even denser than recorded in the USDA survey units. Soils on the river-fronting edge of the Western Terrace ranged from a silt loam on the surface to pure clay subsoil. Soils along the northern edge of the eastern terrace were similarly dense and clayey.

Topography

The Rice Center topography and constituent landforms are typical of the north side of the Middle Lower James. The dominant Rice Center landforms consist of two broad upland terraces that front the river. These terraces are separated by the incised Kimages Creek valley. The major landform features defining the Rice Center can be characterized as: 1) Upland Terraces 2) Terrace Slopes; 3) Low Order Streams and Associated Floodplains; and 4) James River Shore and Inter-tidal zone. A fifth, distinctive entity is the Lake Charles Shore. Although purely a cultural feature, the former lake remains a major element of the present day Rice Center landscape.

Upland Terraces

The upland landforms that define the Coastal Plain topography of the Rice Center and surrounding areas consist of fluvial-marine terraces of Pleistocene age. These terraces have been alternately reworked by the ancestral James River and associated tributaries, and by the direct and indirect impacts of transgressive and regressive Pleistocene sea levels. Internally, the terraces are comprised of well-sorted to poorly sorted sands, silts, clays and gravels. In places, the ancestral James sorted coarse-grained sediment into extensive channel and bar deposits that now lie buried within the river-fronting uplands.

Two separate upland terraces comprise the bulk of the Rice Center lands, with the entrenched Kimages Creek valley dividing these two landforms. The terrace west of Kimages Creek is triangular in shape. Its western side is defined by the unnamed drainage, the southern end by the James River bluff and the east side by Kimages Creek valley. The terrace itself is nearly level with only slight variance in the surface contour. This landform is herein referred to as the Western Terrace. The corresponding landform east of Kimages Creek (the Eastern Terrace) is more expansive. However, these uplands are more uneven, with minor undulations throughout. In general, the Eastern Terrace rises slightly from west to east and elevations reach 40 feet along the eastern limits of the property. The Eastern Terrace is cut through the center by a minor tributary to Kimages Creek. The drainage splits to form a narrow, Y-shaped valley which roughly divides the Eastern Terrace into northern and southern halves.

Terrace Slopes

Relief created by the down cutting streams can be fairly pronounced, and the resultant slopes stand in contrast to the relatively benign topography that otherwise characterizes the Inner and Middle Coastal Plain. At present day, the terrace slopes appear stable, except where they have

been encroached by meandering stream courses. Some erosional soil movement is evident along steeper sections as manifested by the occurrence of minor colluvial aprons and fans along the foot of the terrace slopes.

The terrace slopes differ between the Western Terrace and the Eastern Terrace. Slopes along the Western Terrace are well defined and fairly regular. In most places, the terrace falls off towards the stream bottoms and James River face in a fairly uniform grade. By contrast, the edges of the Eastern Terrace are varied and complex. In areas overlooking Kimages Creek, gullies frequently cut the terrace edge, forming terrace lobes. Along the James, lower lying terrace lobes and narrower, spur-like landforms extend out toward the river shore.

Low Order Streams and Associated Floodplain

There are two low order drainages within the Rice Center. These are Kimages Creek, which roughly bisects the property, and an unnamed stream marking the property's western limits. Kimages Creek is a minor, second order stream that has its headwater approximately three miles north of Route 5. Within the Rice Center itself, most of the stream valley is drowned by the Lake Charles impoundment. At the very northern end of the property a short stretch of Kimages Creek lies above the normal Lake Charles pool level. Kimages Creek is typical of the minor drainages in the area, which meander through a valley cut into the uplands over time. While much of the stream bottom and minor flood plain areas are low and poorly drained, minor stream terraces occur in places. These subtle landforms are comprised of sands and gravels and therefore tend to be well-drained in relation to the surrounding boggy floodplain. The unnamed first order stream that demarcates the western limits of the Rice Center is more narrowly entrenched than Kimages Creek. The unnamed stream is fully embayed at its mouth and most of the valley bottom consists of wetlands.

Lake Charles Shore

The majority of the Lake Charles shore appears to be relatively undisturbed. In some areas, small bank undercuts have developed as a result of minor wave action along the former lake shore. On the north (upstream) end of the impoundment, the former lake margins meld with the poorly drained Kimages Creek floodplain.

James River Shore and Inter-tidal Zone

The James River Shore at the Rice Center can be broken down into four main components. These are: a) the bluff; b) the beach line; c) the embayed mouth of Kimages Creek; and d) the inter-tidal zone. The bluff consists of a steep face fronting the James River. In most places, active erosion is evident at its base where storm tides and wave action have created undercuts, precipitating minor calving and slumping of the bluff face. The same processes can be observed on a larger scale along adjacent parts of the James shore where the formerly meandering channel cut into the adjacent upland terraces. Shoreline areas just on the upriver side of Lake Charles are heavily disturbed and reworked. Also evident is extensive erosion resulting from the over dam spillway flow. The inter-tidal zone is defined as the lying between the base of the bluff and the low tide line. Given that the tidal range along the Middle Lower James is greatly influenced by astronomical factors and weather conditions, and that water depths along the Rice Center shore

are very shallow, the spatial definition of the inter-tidal zone is indistinct. The river bottom sediments immediately adjacent to the shore are fairly coarse, as the relatively high-energy hydrological environment created by tidal flow and wave action tends to winnow out smaller sediment particles. Bottom texture rapidly becomes finer with distance from the beach shore.

The James River at the Rice Center

Beyond the inter-tidal zone, the James River bottom drops quickly into a narrow relic channel. This channel, which is one of three in the area of the Rice Center, parallels the shore line from Epps Island to Harrisons Landing. Depths range from 10 to 25 feet at mean low tide. Beyond the first channel lies a broad area of shallows, a foot or less in depth. The main channel, passes close to Jordan's Point on the river's south bank. A secondary channel splits off the main channel to cut across the Tar Bay shallows. These channels are separated by a broad tidal flat that support minor areas of emergent vegetation. The main channel is dredged for modern navigation. Some of the flats that lie between the main channel and the southernmost channel may have been augmented by historic dredge spoil.

Present Day Land Use

At the time that VCU acquired the Rice Center lands the property had been largely unused since the demise of the YMCA camp during the mid-1970's. During the nearly quarter century or so that the Rice family owned the property, the former athletic fields were maintained in grass/meadow and vegetation was suppressed around the existing structures as well as along the roadways leading into and through the property. Access was restricted during these years.

Vegetative Communities

The following subsection provides a short, baseline description of the Rice Center vegetative communities at the time the property was acquired by VCU. First given is a general summation of the ecological character of the Rice Center forest community followed by synopsis of existing vegetative communities.

General Ecological Character of the Rice Center

The majority of the Rice Center's western half is forested in intermediate growth hardwoods interspersed with minor stands of loblolly pine. By contrast, the eastern third of the property is under loblolly monoculture. This area was clear cut and planted during the mid-1970s. A second area of predominately pine forest is centered along the western (upriver) side of former Lake Charles. This area is an old agricultural field that was planted in pine sometime during the 1940s. The present day forest community is in an early stage of hardwood succession with intermediate growth maple and beech comprising secondary forest components.

Hardwoods dominate the remaining upland portions of the Rice Center. White oak is by far the most abundant tree species in these areas. Red maple, chestnut oak, northern and southern red

oak, black oak and scarlet oak also occur. Despite a predominance of hardwoods, these forests are well short of a climax state. Mature and immature loblolly pine occurs both in isolation and as minor stands. Understory remains well developed and includes holly as well as a mix immature pine and soft and hardwood deciduous species.

The bottomlands associated with the unnamed drainage host a hydrophilic forest community that includes bald cypress. A mix of pine and immature American holly predominate along adjoining terraces edges. American holly is major understory component in these same areas. *Viburnum* species also comprise the understory, as do immature loblolly pine, various hardwoods, and Eastern red cedar. Holly is particularly prevalent along draws and strongly sloping areas near the terrace edges. Privet occurs in some places, most notably along the extreme northwest corner of the property. Here this invasive ornamental is the dominant understory species and is seen crowding field edges and the roadway fringe. Mature eastern red cedar line the Rice Center property limits in this same area. English ivy, another naturalized ornamental occurs as thin ground cover along the Kimages Creek-facing terrace slopes near the James River bluff. Johnson grass, a common invasive species along the Lower James sporadically finds a foothold along the open, river fronting beaches.

The forest make up of the Rice Center has been systematically characterized through transect sampling. Trees along preselected transects were recorded by species and diameter at breast height. The transect data underscore the less than mature state of the non-cultivated Rice Center forest communities. In general, intermediate growth trees predominate while new growth specimens crowd mid-story areas. Of the 2,764 tree specimens recorded in the study, only 179 (or 6.5%) were larger than 50 cm breast height diameter. Also recorded as outliers where a limited number very large, mature trees. These likely represent individual old growth specimens that predate the forest regeneration that occurred during the 20th century. Table 3-1 tabulates by species trees larger than 50 cm recorded in the transect study.

Table 3-1 Transect Recorded Trees by Species Greater than 50 cm Diameter			
Species	Common Name	Number	Percentage
<i>Quercus alba</i>	white oak	95	53.8
<i>Liriodendron tulipifera</i>	tulip poplar	12	6.7
<i>Quercus prinus</i>	chesnut oak	11	6.1
<i>Pinus taeda</i>	loblolly pine	10	5.5
<i>Acer rubrum</i>	red maple	10	5.5
<i>Quercus falcata</i>	southern red oak	9	5.0
<i>Quercus rubra</i>	northern red oak	6	3.3
<i>Quercus velutina</i>	black oak	5	2.9
<i>Fagus grandifolia</i>	beech	4	2.4
<i>Liquidambar styraciflua</i>	sweet gum	3	1.6
<i>Quercus phellos</i>	willow oak	3	1.6
<i>Carya tomatosa</i>	mockernut hickory	2	1.6
<i>Fraxinus pennsylvanica</i>	green ash	2	1.0
<i>Quercus coccinea</i>	scarlet oak	2	1.0
<i>Ilex opaca</i>	American holly	1	0.5
<i>Prunus serotina</i>	black cherry	1	0.5
<i>Fraxinus americana</i>	white ash	1	0.5
<i>Nyssa sylvatica</i>	black gum	1	0.5
<i>Ulmus alata</i>	winged elm	1	0.5
Total		179	100

Table 3-1 provides a very good impressionistic view of the contemporary Rice Center forest community. Clearly shown is the predominance of white oak, which makes up over half of the larger tree specimens recorded in the transect study. Mature loblollies make up 10 percent of the sampled trees over 50cm. These mature pines are significantly larger than the specimens found across the pine plantation areas. The transects study also identified an area of larger tree specimens located just south and within the Kimages Creek tributary valley that divides the Eastern Terrace into two sections. The largest recorded white oak, loblolly pine, beech, and red maple specimens were all located within this low, cove-like setting.

Section 4 Geological, Climatological and Ecological Context: The Natural History of the Rice Center

Introduction

Two primary natural forces operated in concert to shape the Lower James River landscape since the end of the Pleistocene. These were a general warming of the global climate, followed by rising sea level brought on by the resultant melting of continental glaciers and reductions in the polar ice caps. During the last glacial maximum, the Atlantic coastline lay over a hundred miles east of its present location. As the climate warmed, rising sea levels ushered in profound physical changes to the Lower James River. At around 11,500 years ago, the first Native Americans to witness the Lower James would have viewed a free flowing river contained in a fairly narrow channel. Continuing Holocene sea level rise decreased the river gradient, causing the James to meander and cut multiple, braided channels. Further rise caused the river to exceed its channel banks, transforming the adjacent floodplains into expansive wetlands and ultimately, the shallow tidal estuary we know today. The climate shift that ushered in the Holocene era also fostered dramatic changes in the vegetative cover and plant communities of the Lower James area. In eastern Virginia, Pleistocene forests of spruce, fir and white pine were replaced by oak, hickory, and warm adapted pine species. In a continental context, a wholesale extinction of large mammal species accompanied the Pleistocene/Holocene transition. The change from the boreal forests of the Pleistocene to modern environmental conditions was relatively rapid, and largely complete by around 8,000 B.P. This section provides a basic accounting of the natural history of the Rice Center setting. The recent geological history of the Lower James River as well as its dynamic climate and changing ecological character are summarized in post-mid Pleistocene time scale.

Geological History of the Lower James River

Virginia has a rich, varied, and complex geologic past. Each of the state's five main physiographic provinces consisting of the Coastal Plain, Piedmont, Blue Ridge, Ridge and Valley, and the Appalachian Plateau are highly distinct, with unique physical characteristics and formational histories. By definition, the Lower James River falls entirely within the Coastal Plain. In contrast to the river's mountainous sections which are often confined within a narrow valley, the Coastal Plain James has been free to meander widely across the landscape, cutting and filling various channels over time. Today, channel deposits associated with the ancestral James River form the basis of lucrative sand and gravel mining operations in eastern Henrico and Charles City counties.

In comparison to other parts of the state, the Coastal Plain landscape is exceedingly young, and owes much of its configuration to the effects of fluctuating sea levels during the Pleistocene. The James River Coastal Plain consists of a thick mantle of unconsolidated sediments resting on a bed of ancient bedrock. This overlying mantle is variously composed of sands, gravels, clays,

silts, and marl. These sediments were laid down in both shallow marine settings and fluvial environments. Significant portions of these deposits have been reworked by changing surface hydrology and migrating shorelines associated with changing sea levels. Deeper sediments of the Virginia Coastal Plain, which often contain extensive marine clay and marl deposits, date to the Miocene and are roughly 20 million years of age. Surface and near surface deposits are far younger, typically dating to the latter Pleistocene.

During the last glacial maximum, so much of the earth's water was tied up in polar ice caps and continental glaciers that sea levels were as much as 130 meters lower than today (Edwards and Merrill 1977). As a result, vast areas of the continental shelf lay exposed and a land bridge connected Siberia and Alaska. In the interior of the North American the ice sheet approached two miles in thickness. Along the Atlantic seaboard, glaciers extended south as far as New York City. Long Island represents a terminal moraine feature marking the outer, eastern edge of the continental ice sheet's advance. Virginia escaped the direct impact of Pleistocene glaciers, which rounded off mountains and left other indelible marks on the New England landscape. However, indirect physical effects of the Pleistocene glaciations to the Coastal Plain of Virginia were not insubstantial. Repeatedly regressing and transgressing sea levels and resultant fluctuations in stream/river morphology, gradient, and sediment loading worked to sculpt the present day Coastal Plain landscape.

The last glacial maximum provides a logical benchmark for charting the evolution of the present day Lower James River. Sea levels, which had been dropping since the onset of the Wisconsin glacial episode approximately 40,000 years ago, reached a low point between 18,000 and 14,000 years ago (Edwards and Merrill 1977). With global warming that precipitated the end of the final Wisconsin glacial episode, sea levels began a rapid rise, reaching a rate of 1.60 m per century between 10,000 and 6,000 years ago (Milliman and Emory 1968). This resulted in the inundation of the gently sloping portions of the continental shelf, actively pushing the Atlantic coastline westwards. It is estimated that for every 0.30 m rise in sea level, the coastline of the time would move 510 horizontal meters. Approximately 5,000 years ago, the rate of sea level rise slowed to approximately 0.20 m per century (Milliman and Emory 1968).

It should be noted that sea level rise on the eastern US seaboard is calculated in relative (to land surface) rather than absolute terms due to the continental scale physical distortions of the earth's surface caused by the weight of the ice sheets. The ice sheets, which reached 3,500 to 4,000 meters in thickness, caused the North American interior to sag while the underwater continental shelf rose up. With the ice sheets melted away, the interior (very slowly) rose back up in a process known as isostatic or post-glacial rebound. The continental shelf slowly subsided as part of the same process. These slow physical adjustments in the earth's surface continue through present day.

Holocene period relative sea level curves were generated by Kraft (1977) for the Delaware Bay, and these data have been used in reconstructions of the Middle Atlantic Coastal Plain settings. More recently, Colman, Halka and Hobbs (1991) have provided data specific to the Chesapeake region that can be more directly applied to a reconstruction of the Lower James River. Their analyses show that rising ocean waters reached present day mouth of the Chesapeake at Cape Charles around 10,000 years ago. Ongoing, relatively rapid rise in sea level resulted in waters backing into the massive ancestral Susquehanna River, eventually overtopping the channel edges

to form the Chesapeake Bay. This process was well underway by 6,000 years ago. By 4,500 years ago, rising waters had pushed up the Susquehanna River and its major tributaries of the Potomac, Rappahannock and the James. In the area of the Rice Center, sedimentological data from streambed cores point to the embayment of the James River as far upstream as the mouth of Baileys Creek in eastern Henrico County by around 5,000 B.P. (Johnson and Peebles 1983). Full tidal influence likely extended to the base of the Falls during the following millennium. By 3,000 B.P., the entire Chesapeake estuary system had essentially reached its modern day configuration.

As a direct result of this sea level rise, the Lower James fronting the Rice Center was transformed from a flowing river contained within a narrow channel, to a broad tidal estuary. Accompanying the physical transformation of the James River were significant environmental changes, including the expansion of wetlands and the development of estuarine ecosystems. The development of these productive environments along the Lower James River presented Native American peoples in the area with new resources and opportunities. As detailed in the succeeding chapter, the exploitation of these new resources set the stage for significant changes in prehistoric life ways (Mouer 1990, 1991, Dent 1990, Potter 1993).

Holocene Climate History of the Lower James River

The climate change that marked the onset of Holocene conditions was nothing short of profound. During the late Pleistocene, average temperatures in the Virginia Coastal plain were significantly cooler than today. Forests in eastern Virginia more closely resembled those of eastern Canada and northern Maine than present day southeast United States. The Paleo-indian peoples that roamed the Coastal Plain some 11,000 years ago experienced a climate that was on average 10 degrees centigrade cooler than today (Edwards and Merrill 1977). The early to mid-Holocene (ca. 8,000 B.P.) saw a very rapid transition to a temperature regime not unlike that of present times. Provided below is a brief synopsis of Holocene climatological reconstructions, as best they exist, for the Virginia Coastal Plain. These reconstructions are based largely on pollen profiles and other paleobotanical evidence and as such, climatological and ecological reconstructions are closely interrelated.

While the Pleistocene-Holocene transition was accompanied by a dramatic warming of the climate, the succeeding millennia have been characterized by shorter term and less pronounced variations. The cause for these shorter term oscillations are not fully clear and remains a subject of active research and debate.

In the southwest United States, a refined record of Holocene climate shifts has been established through dendrochronology. By linking tree ring patterns in extant, long-lived trees such as the bristlecone pine with those in wood recovered from archaeological contexts and other settings, scientists have compiled an unbroken record of growth patterns stretching back 8,500 years. Dendrochronology is an invaluable tool for archaeological dating but also in its very nature, provides a year by year accounting of growth conditions for a particular location. The dendrochronological record for United States outside the Southwest region is somewhat limited, and researchers have traditionally relied on pollen cores in attempting to chart the past climate variances.

A number of climate reconstructions have been attempted for the Middle Atlantic region. Archaeologists working in Virginia most frequently cite the synthetic work of Victor Carbone (1976) based on his pollen core studies in the Shenandoah Valley. A basic characterization of the climate regime arrived at by Carbone is summarized in Table 4-1.

Table 4-1 Generalized Climate History for the Middle Atlantic.

Period	Years B.P	Conditions
Late Glacial	15,000-13,000	Cold and wet. Tundra-like along the ice front to the north. Spruce, fir and sedges further south
Pre-Boreal	13,000-10,700	Cold and wet. Grasslands and boreal forest. Spruce and cold climate pine dominate.
Boreal	10,700- 9,200	Significant warming. Spruce and fir diminish rapidly and hardwoods expand.
Atlantic	9,200-6,600	Development of modern climate conditions, expanding hardwood forests.
Sub-Boreal	6,600-2,000	Warming and drying of climate. Oak-hickory forests dominate. Some expansion of grasslands
Sub-Atlantic	2,000-present	A general and progressive cooling trend. Significant and abrupt shifts in precipitation during mid-period.

Source: Carbone 1976

Until relatively recently, both archaeologists and paleo-climatologists have worked under the paradigm that past climate changes had been relatively gradual, even during times of pronounced shifts such as those that accompanied the end of Pleistocene. In this context “gradual” can be thought of as occurring well outside the human time scale. A significant body of research now indicates otherwise. It is probable some climate changes that occurred during the end of the Pleistocene (and since) were so sudden and dramatic that their effects could have been, and probably were readily noticeable by humans living at the time.

These shifts included the rapid warming of the planet and corresponding melting of the Continental ice sheets, which reached a peak around 13,000 B.P. This was followed by a rapid reversal of the climate around 11,000 B.P. in an episode known as the Younger Dryas. The exact cause of the Younger Dryas cool down is under debate by the scientific community (Vento et al. 2008) and is also somewhat out of scope for this work. What seems certain, however, is that this and similar oscillations were supported by global-scale feedback mechanisms driven by changes in atmospheric, and more importantly, ocean water circulation patterns. One scenario for the onset of the Younger Dryas has massive volumes of dammed up glacial melt water diverted from the mid-continent Gulf of Mexico drainage, east into the St Lawrence valley and the Atlantic, with resultant changes in water temperature/density/salinity disrupting ocean circulation and thus triggering a sudden climate shift throughout the northern hemisphere (Vento et al. 2008).

More relevant perhaps to the study of the Rice Center environment and its human use are the later, mid-Holocene shifts in precipitation patterns and ongoing rising sea levels that ushered in physical changes to the local river systems. These include changes in floodplain accretion and dynamics as well as occurrence of aeolian, or windblown soil deposition. Archaeologists in the Middle Atlantic Coastal Plain have also long noted the occurrence of aeolian soils over

prehistoric site surfaces dating to around 4,500 B.P. to 3,000 B.P., particularly in the Delmarva region (Curry 1980; Ward and Bachman 1987; Curry and Ebright 1989; Daniel 1993; Heite and Blume 1995). Custer (1989) presents the occurrence of these aeolian soils as evidence of moisture stress associated with a very warm and drought prone period within the Sub-boreal period, which he has termed the mid-post-glacial xerothermic. According to this model, recurring droughts would have denuded some areas of vegetation and desiccated the soil, allowing it to be transported by wind action. Custer (1989) further maintains that the mid-post glacial xerothermic played a significant role in cultural changes of the time. While the presence of aeolian soils in association with archaeological contexts of the period is not in dispute, many researchers now attribute the phenomenon as being more closely linked to the changing sedimentary environments and hydrological regime of the adjacent stream and river beds, rather than being closely tied to extreme climate conditions. Further, Delcourt and Delcourt (1985) place the period of maximum post-glacial warmth and aridity some 3,000 years earlier, or from 7,500-5,000 BP, while noting that these dates are in agreement with climate reconstructions for the Great Plains and near Midwest regions.

The aforementioned changes in riverine sedimentary environments relating to aeolian soil transport are closely linked to rising sea levels. Atlantic Coastal Plain rivers, including the James responded to a reduction in gradient by meandering and cutting multiple braided channels. This resulted in the creation of point bars along the inside of bends, and sloughing and calving of banks along the outside of the channel cuts. During times of low water, these fresh sediments would be desiccated and made available for aeolian transport by strong summertime southwest winds or during the arrival of dry wintertime cold fronts from the northwest. This aeolian activity would have largely ceased with further reduction in river gradient as floodplains became characterized by low-energy, fine textured deposition, after which they were fully inundated and the rivers became embayed.

In South Carolina, Brooks et al. (1998) present the onset of aeolian activity in the Wateree River to Big Bay sand sheet, and its subsequent cessation as being independent of climatic factors. Brooks et al. (1998) cite the sea level rise-induced transformation of the Wateree River from a braided, sediment-choked floodplain, to one characterized by the low-energy, overbank deposition of fine sediment by around 3,000 B.P. This latter condition resulted in the emergence of dense floodplain vegetation and together, these developments essentially shut off the river as a source of sediment available for aeolian transport (Brooks et al. 1998:57). Data from the Coastal Plain Savannah River points to similar transformations in local environments around 4,000-3,000 B.P., which closed off the riverbed and floodplain as a source of aeolian sediment (Brooks et al. 1998:57).

Virginia Commonwealth University archaeologists working on Curles Neck Farm just upriver from the Rice Center have documented the burial of prehistoric site living surfaces dating to 4,500-2,500 B.P. along westward facing James River terraces (Virginia Department of Historic Resources Site Files). As the sites were located on high, level ground, the source for the soil blanketing the area was almost certainly James River sediment transported by vigorous westerly winds blowing across exposed bars to collide with, and be lifted up by the bluff face.

Historical record keeping in Virginia begins with the establishment of Jamestown in 1607. Accounts of English settlement along the Lower James River suggest that the early 17th century

was a period of weather extreme, including severe drought and harsh, difficult winters. However, as newcomers the English settlers had no historical reference point for their observations. In Europe on the other hand, a wide range of sources chart a long period of colder, stormy weather from the Late Middle Ages through the end of 17th century. This episode, which began around 1300, is popularly referred to as the Little Ice Age. Antidotal evidence for such a cooling of the European and North Atlantic climate has long included the collapse of Norse settlement in Greenland, descriptions by William Shakespeare and contemporary writers of a snow and ice bound London, and numerous period paintings of frozen rivers and canals in Flanders as well as other European locations which only infrequently experience similarly harsh conditions today.

The cooling trend referred to as the Little Ice Age has since been extensively documented scientifically. Of particular utility are core samples from Greenland ice caps. Study of these samples has allowed calendar year correlation to within one percent (Fagan 2000). Additionally, tree-ring growth studies which prior to the 1960s were limited to the southwestern United States, have been successfully employed to establish temperatures reconstructions across Northern Europe (Fagan 2000). Other lines of evidence for charting the Little Ice Age in Europe include historical accounts detailing variations of the sea temperature-sensitive late medieval North Atlantic cod fishery, accounts of persistent crop failure and spiking grain prices, and monastery records chronicling the date of first snowfall, commencement of spring planting, or other weather related seasonal events (Fagan 2000).

The late 16th and early 17th century was also clearly a time of weather extreme on the western side of the Atlantic as well. These conditions would have presented early English colonists with additional hardships in what was already a very difficult undertaking. Recent tree-ring studies (Stahle et al. 1998) on bald cypress trees along the Nottoway River in southeastern Virginia provided a drought reconstruction for southeastern Virginia stretching back to 1185. The studies confirm that the initial English settlement of North America coincided with periods of severe moisture stress. Specifically, the reconstructions demonstrated that the Roanoke Island colonial venture of 1585 had the misfortune of experiencing the worst drought conditions in 800 years. In addition, the founding of Jamestown in 1607 coincided with a seven-year drought (1606-1612) that was almost equal in severity. Both colonies were located around swampland. The drought conditions likely made obtaining suitable drinking water even more difficult and thus may well have been a factor in the Roanoke Island colony's demise, and in the appalling death rates experienced at Jamestown (Stahle et al. 1998).

Ecological History of the Lower James River

The dramatic global climate warming that ushered in the Holocene period precipitated wide reaching changes in forest type and other vegetative cover in the region. During the late Pleistocene, eastern Virginia was forested in white pine, spruce and fir. Areas of the western Virginia highlands experienced tundra-like conditions. During the first millennia of the Holocene, the northern-type forest in the area was replaced by one dominated by oak, hickory and warm adapted pine species.

Whitehead's (1972) pollen analysis for the Dismal Swamp cores provides a fine-grained view of vegetative communities in southeastern Virginia for the period 10,600-8,200 B.P. During the

early Holocene approximately 10,600 years ago, forests in southeastern Virginia were comprised of beech, hemlock, and birch. This composition is interpreted by Whitehead (1972) as likely representing a transition stage between the white pine-spruce forests of the later Pleistocene and oak-hickory association that would come to be dominant by 8,200 B.P.

In Eastern North America, the timing of the transition from a cold adapted pine-spruce forest to one dominated by oak and hickory was also dependant on latitude and elevation. In essence, the geographic limits of the cold adapted tree species in Coastal Plain environments retreated steadily northwards in response to ongoing Holocene warming. In the South Carolina Coastal Plain, the change from a boreal to a deciduous hardwood forest appears to have been underway at the beginning of the Pleistocene-Holocene transition some 13,000 years ago (Watts 1980). By around 9,000 years ago, this transition was occurring in southeastern Virginia as demonstrated by Whitehead (1972). At the Indian Creek site in Prince Georges County, Maryland, LeeDecker (1991) reports an increase in birch over pine and spruce at around 7,600 B.P. Oak species as well as hazelnut and alder began to dominate the site about 5,000 years ago. Pollen analysis of pond cores in New Castle County, Delaware, suggests that oak-hickory forest conditions were fully established in that location by 5,800 B.P. (Newby, Webb and Webb 1994). Today, boreal-type forests similar to those that covered Virginia in the Late Pleistocene and Early Holocene characterize inland areas of northern Maine. Closer to the study area, spruce, hemlock and fir still occur along sheltered coves in the highest Appalachian uplands. Regionally, these stands represent living relics of different environmental era and that as survivors have sought refuge in isolated locations with growing conditions reminiscent of their heyday.

In the Virginia Coastal Plain, upland forests of the mid-Holocene were characterized by oak, hickory, and warm adapted pine species, while bottom land areas supported beech, maple, sycamore and poplar, sweet gum and to some extent, bald cypress. Bald cypress is particularly well adapted to saturated soils and thrives in standing water conditions. Eastern Virginia is near the present day, northern limits of the bald cypress' geographic range. As such, the presence or absence of the species could represent a sensitive marker to intermediate-term climate changes, as well as having a demonstrated ability to yield quality tree-ring data.

Ongoing sea level rise not only resulted in a physical transformation of the James and other coastal plain rivers, but also ushered in significant ecological changes. Sea level rise resulted in the development of wetlands bordering major drainages and was also a factor in the expansion of interior swamps. In southeastern Virginia, sea level rise resulted in the transformation of the Dismal Swamp from an area interspersed by low scarps and a web of stream valleys, into a single expansive wetland (Blanton 2003). Sedimentary and pollen cores indicate that this transformation was concluded around 3,500 B.P. (Whitehead and Oaks 1979). Between 6,000 B.P. and 3,500 B.P., intervening fluvial scarps and uplands supported extensive oak-hickory forests while the stream bottoms were vegetated with in hydrophilic communities. These upland forests shrank over time with rising ground water levels, until the entire area coalesced into a peat wetland supporting an expansive gum-cypress forest (Blanton 2003). Similar, albeit smaller scale transformations likely occurred along the margins of interior streams feeding the Lower James, and along the mouths of these tributaries as the tidal river levels rose and began backing up the adjoining minor tributary drainages.

It is likely that the vegetative communities of the Lower James River reached a relative stasis with the final development of the present day tidal estuary around 3,000 B.P. The oscillations in climate that occurred from the mid-Holocene onwards may not have altered the local forest communities to a significant degree. Temperate deciduous forests characteristic of the Middle Atlantic region are highly resilient and can withstand significant stress. The major effect of post mid-Holocene climate oscillations would have been an increase in fire during times of drought, with a corresponding increase in forest succession conditions. This would have resulted in an increase in pine within the overall forest make up. By contrast, a wetter and cooler climate would have fostered the retrenchment of climax forest conditions. During the second half of the Holocene the most significant and lasting impact to the vegetative communities and forest environments of the Lower James River would have been due not to climate but rather cultural factors.

Section 5 Cultural Context: Prehistory and History of the Lower James River

Introduction

Section 5 provides an overview of the human presence in the Lower James River spanning from earliest prehistoric times through the present day. The overview is divided into the prehistoric and historic periods. Discussion of prehistoric cultural context is carried out within cultural/temporal divisions commonly used by archaeological researchers working in the region. The historical period is also subdivided within logically defined eras, beginning with the founding of Jamestown in 1607 and continuing through the post-World War Two years to the present day. The same temporal divisions are applied in the successive chapters detailing the prehistoric and historic settlement and land use, land use impacts, and in the succeeding time line reconstruction of the Rice Center study area.

Culture History of the Lower James River Area

The Prehistoric Period

Native Americans have populated eastern Virginia for at least 11,500 years. The traditional paradigm for the initial settlement of North America holds that humans first made their way to the continent approximately 11,500 years ago, during the waning centuries of the last Wisconsin glacial episode. These people, presumed to have migrated from Asia by utilizing a land bridge between Alaska and Siberia, possessed a sophisticated stone tool technology including distinctive, finely made spear points. The best known of these spear points is the Clovis type, named after a major kill/butcher site uncovered near Clovis, New Mexico. The Clovis people spread over much of the continent, reaching Virginia approximately 11,500 years ago. These people and their culture are commonly referred to as Paleo-indian.

Archaeologists working in the Middle Atlantic region divide prehistory into three basic temporal units as first proposed by Griffin (1967). These are: 1) the Paleo-indian, 2) the Archaic, and 3) the Woodland. The delineation of the Paleo-indian-Archaic-Woodland periods represents coarse-grained cultural/chronological groupings used to categorize broad trends in material culture (technology) and lifeways. Undoubtedly, there existed significant local and regional variability at any given period. In general, however, cultural attributes earlier in prehistory were more uniform and geographically more widespread, while increasing diversity and regional variation is archaeologically documented through time. Archaeological evidence of Paleo-indian culture is found across the continental United States. Traits shared by earlier Archaic period groups, such as specific stone tool styles, are more restricted in geographic range but are nonetheless found across areas as large as the Eastern Seaboard from northern Florida to New York west to the Appalachians. The Woodland period in eastern North America was characterized by progressive regionalization of technologies/material culture, life ways, and

socio-political organization. This process culminated in the fantastically diverse mosaic of Native cultures encountered by the first Europeans to arrive on North America's eastern shores.

The Archaic and Woodland are typically broken down into the Early, Middle and Late sub-periods. The Late Woodland ends with the arrival of European settlers. In Virginia, the establishment of the first successful English settlement at Jamestown in 1607 is generally used to define the beginning of the Contact Period. Original contact between English and Native American cultures occurred during the late 16th century with the unsuccessful attempt at colonizing Roanoke Island in North Carolina. The 16th century witnessed other European-Native contact in Virginia, including the brief establishment of a Spanish Jesuit Mission on the York River side of the Peninsula. These short term encounters appear to have had a negligible influence on the indigenous Native American societies. However, the half century or so prior to 1607 was characterized by a significant increase in political complexity within Native groups in eastern Virginia, including the full development of ranked society. In that regard, the term Proto-historic is sometimes applied to the last decades of the Late Woodland era immediately preceding 1607.

The archaeological definition of Native American cultures is aided by chronologically diagnostic artifact types. For much of prehistory, Native American peoples manufactured distinctive tool and projectile point forms. In some cases, repetition of these forms occurred over many centuries. The consistency with which certain styles were produced, both across time and geographic space, strongly suggest that powerful cultural mechanisms were in place to reinforce the maintenance of these traditions. As such, the adherence to a specific projectile point manufacturing style was almost certainly an expression of cultural identity. While the point styles changed over the centuries, different styles associated with different cultural groups probably coexisted in place and time. Later in prehistory, Native American groups manufactured specific pottery styles that have unique vessel forms, temper and surface treatment. As a result Native American ceramic wares are culturally as well as chronologically diagnostic artifacts.

The introduction of ceramic technology around 1100 B.C has traditionally been used to define the break between the Archaic and Woodland. However, in terms of material culture, settlement patterns and other life ways, the latter years of the Late Archaic and the beginning of the Early Woodland clearly represent a continuum. The greatest changes in Native American life ways occurred around A.D. 900-1000, at the beginning of the Late Woodland. This time period saw an increase in village settlement and the adoption of formal horticulture utilizing tropical cultigens, notably maize, beans and squash. The Late Woodland in eastern Virginia also saw the rise of ranked, politically complex societies.

While there is some minor disagreement between individual researchers working in the Middle Atlantic, Table 5-1 presents the basic chronology of the region, and the artifact styles and types characteristic of each period. This is followed by a brief synthetic overview of the defined cultural periods in eastern Virginia.

Table 5-1 Basic Prehistoric Cultural Chronology of the Virginia Coastal Plain

Period	Time Range	Primary Diagnostic Artifacts
Paleo-indian	9,500 – 8000 B.C. (11,500-10,000 BP)	Clovis, “Middle Paleo” Hardaway-Dalton points
Early Archaic	8,000 – 6,500 B.C. (10,000-8,500 BP)	Palmer, Amos, Kirk-corner points
Middle Archaic	6,500 – 2,500 B.C. 8,500 - 4,500 BP)	LeCroy, Stanley, Morrow Mt., Guilford, Halifax points
Late Archaic	2,500 – 1,100 B.C. (4,500 - 3,130 BP)	Savannah River, Susquehanna, Perkiomen points, soapstone vessels
Early Woodland	1,100 – 500 B.C. (3,100-2500 BP)	Marcey Creek, Accokeek ceramics, small stemmed, notched points.
Middle Woodland	500 B.C.- A.D. 1000	Mockely and various regional ceramics, Rossville, Potts, Fox Creek points
Late Woodland	A.D. 1000 - 1607	Townsend, Potomac Creek
Contact Period	A.D. 1607 – ca. 1644	Gaston/Roanoke ceramics; triangle points Gaston/Roanoke ceramics, small triangle points, European trade goods

The Paleo-indian Period 9,500 – 8,000 B.C. (11,500-10,000 BP)

The Paleo-indian period has traditionally been regarded as representative of the earliest human occupation of North America. These peoples are presumed to have migrated from Siberia utilizing a land bridge across the Bering Sea that existed at the end of the last Wisconsin glaciation. When the Paleo-indians roamed Virginia, the landscape was dramatically different than today. During these waning centuries of the last Ice Age, regional mean temperatures were as much as 10 degrees Centigrade cooler than in modern times. Large portions of the continental shelf lay exposed by reduced sea levels. Extensive stands of spruce and white pine covered much of eastern Virginia with the landscape more akin to the boreal forests of interior Maine or eastern Canada than anything we see in the region today.

In Virginia, the Paleo-indian period is characterized by fluted Clovis points and similar tool forms. Overall Paleo-indian populations were very small, and sites dating to the period are exceedingly rare. Paleo-indian people had a marked preference for crypto-crystalline rock, such as high quality chert and jasper for the manufacture of their distinctive tools types. Paleo-indians have long been considered to have been highly nomadic and closely tied to the hunting of Pleistocene animals, including now extinct mega fauna species such as mastodon. Most researchers subscribe to a Paleo-indian settlement model that had small groups of people ranging over wide areas, following game and seasonally exploiting other resources. These Paleo-indian people would periodically revisit specific quarry sites at which the favored high quality stone could be acquired.

The characterization of Paleo-indian peoples as big game hunters is based largely on data from a number of well known excavation in the western United States. In Virginia, direct evidence for a big game hunting focus is largely absent. While there clearly is marked hunting emphasis expressed in artifact assemblages from Paleo-indian sites, the traditional paradigm of these

people as “Ice Age Big Game Hunters” is actively being reconsidered by a growing number of researchers (Walker and Dirskell 2007). Paleo-indian peoples may well have had relatively diverse subsistence practices that included fishing, trapping, small game hunting as well as extensive wild plant food exploitation. A significant difficulty in reconstructing Paleo-indian life ways in eastern Virginia is the loss of coastal and riverine settings to sea level rise and inland river channel migration. As a result, much of what we know about the time period is derived from the study of sites located in upland settings. These sites typically appear to represent short-term encampments geared to hunting and stone tool manufacture. Coastal and riverine sites at which a wider range subsistence of activities could have been undertaken may be underrepresented in the local and regional archaeological records. The poor organic preservation qualities of most Middle Atlantic soils, coupled with the loss of coastal zone Paleo-indian sites to rising sea levels, makes obtaining an accurate picture of Paleo-indian life particularly challenging.

To summarize, Paleo-indian peoples reached Virginia around 11,500 years ago bringing with them a sophisticated stone tool technology commonly referred to as Clovis. They were nomadic and skilled hunters who spread over much of what is today the United States in a matter of centuries. Paleo-indians were highly mobile, and lived in small groups. A strong preference for high quality stone for their tools induced these peoples to visit specific outcrop sites where this stone was available.

The Early Archaic Period 8,000 – 6,500 B.C. (10,000-8,500 BP)

Culturally, the Archaic represents a subtle but clearly recognizable departure from Paleo-Indian times. Artifacts from Early Archaic period sites still reflect a very strong hunting emphasis. However, archaeological evidence points to the exploitation of a variety of food resources. There is a significant increase in the number of sites dating to the period, suggesting ongoing population growth. Group size remained relatively small, however. Peoples of the time moved between sites in small units, effectively exploiting a diverse set of forest resources. Researchers have traditionally presumed these people periodically coalesced into larger groups to collectively exploit seasonal resources, trade, share information, and conduct social activities.

During the transition from Paleo-indian to Archaic times, fluted points disappear and are replaced by regional-based stemmed and notched varieties. Some tool type that were characteristic of the earlier period such as formal end scrapers remain in use. In general, Early Archaic sites contain a variety of cutting tool types as well as hammering/grinding tools, some of them expedient in nature. There also appears to have been a significantly greater use of locally procured stone for the manufacture of projectile points and cutting implements.

Much Archaic material culture sequences in the Middle Atlantic were first described by Joffre Coe (1964) as part of his pioneering work on sites along the Roanoke River in the North Carolina Piedmont. Broyles (1971) added significantly to understanding of Early Archaic sequences based on her work on the deeply buried St. Albans site along the Kanawha River in West Virginia. Other landmark studies that helped define the cultural chronology of the region are Russell Cave in Alabama (Griffin 1974) and Rose Island (Chapman 1975) on the Tennessee River. The basic material culture sequences for the Middle Atlantic are far from complete, and new information from archaeological investigations continually adds to the knowledge base.

While southeast Virginia lacks deeply buried floodplain sites, excavations in aeolian settings on which wind-blown sand accreted between occupation episodes, has helped refine understanding of the Archaic period. Egloff and MacAvoy's (1990) work along the Nottoway River is of particular utility. Excavations on the Cactus Hill Site (MacAvoy and MacAvoy 1997), which has gained international attention as a possible pre-Clovis settlement, also yielded significant new information on Archaic period material culture sequences and patterns.

Early Archaic life ways can best be summarized as an adaptation to the expanding deciduous forest environment. Peoples sustained themselves through hunting and foraging, while moving in small bands between various occupation sites. Although Early Archaic peoples were still essentially nomadic, the increased use of locally available stone for tool manufacture suggests a shrinking settlement round or territorial range.

The Middle Archaic Period (6,500 B.C. – 2,500 B.C.) (8,500 - 4,500 B.P.)

The Middle Archaic period is often described as a period of cultural stability. People of the Middle Archaic lived as proficient hunters and foragers, well adapted to terrestrial sylvan environments. Long standing characterizations of Middle Archaic life ways are often framed by what Caldwell (1958) termed as Primary Forest Efficiency. This model postulates that small groups moved from site to site, probably on a scheduled seasonal round, while utilizing a diverse but fixed set of forest resources. These life ways were likely sustained by the continuing spread of temperate deciduous forests, whose mast-producing canopy could support significantly higher faunal bio-mass than its coniferous predecessor. Oak-hickory forests of the Coastal Plain uplands represented a particularly productive biome. The Middle Archaic also saw the increased use of interior wetlands and minor stream floodplains, possibly in response to the spread of these environments due to ongoing sea level rise. Middle Archaic sites, which most often appear to represent short-term encampments, can be found on uplands overlooking floodplains, along wetland margins, and other ecologically productive locations (Dent 1990). These people are assumed to have organized as egalitarian bands. As in Early Archaic times, a consistency of material culture traits and apparent life ways, both across a wide geographic area and through time, suggest that these people shared a broad, common cultural identity. A diffuse web of social interaction and economic cooperation between individual bands likely constituted the mechanism for maintaining this identity.

The tool kit remained similar to that of the preceding period, with a dominance of chipped stone projectile points, stone knives and scrapers. Most researches in the region delineate the onset of the Middle Archaic period with the appearance of the bifurcate point form. With their double lobed bases, these specimens bear little resemblance to previously known types. Groundstone tools appear on Middle Archaic archaeological sites. Additionally, heavy crudely flaked chopping/grubbing tools as well as cobbles used in grinding are not uncommon finds. The manufacture and use of informal or expedient cutting tools is typical of the time period. In general, site findings are reflective of a short-term occupation by a limited number of individuals. Also there is an accelerated shift across the region toward the use of local stone materials (Dent 1990), suggesting that people may have practiced a more restricted settlement round. Middle Archaic peoples appear to have had a distinctive sylvan focus. However, as in preceding periods, a preservation bias toward stone tools typically employed in hunting and

related activities coupled with the loss of many coastal/riverine sites may give archaeologists a somewhat distorted view of the period.

Nonetheless, archaeological data across the region provide a fairly consistent impression of the Middle Archaic. This data indicate high residential mobility, short-term occupation in any location, a pure hunting and foraging economy, and small group size. Formal projectile point styles remain remarkably consistent both across time and geographic area, suggesting cultural homogeneity and stability. Slow but ongoing population growth is likely to have occurred throughout the period.

The Late Archaic Period (2,500 – 1,100 B.C.) (4,500 - 3,130 B.P.)

In contrast to the cultural stability of the Middle Archaic, the Late Archaic was a period of pronounced cultural change. Major trends of the time include increasing degrees of sedentism, the advent of long distance trade networks, and an intensification of food resource exploitation. While the Middle Archaic cultures of the preceding millennia were largely orientated to terrestrial, sylvan environments, Late Archaic peoples began to exhibit a riverine focus.

The Late Archaic in the Lower James is closely identified with the Savannah River point type. Coe (1964) formally described the Savannah River type in his landmark study of projectile point sequences for the Piedmont of North Carolina. As a morphological group, these points were previously recognized by Claflin (1931) at Stallings Island, Georgia. The Savannah River type is perhaps the most easily distinguishable Late Archaic point in the Middle Atlantic region. In “classic” or modal form, the Savannah River Point is large in size, exhibits a well-formed lance-like blade, together with angular, clearly defined shoulders. Also characteristic of the style is a slightly tapering stem with a concave base. Much has been written on the Savannah River point type in terms of their proposed functional use and implications in the far-reaching cultural changes of the Late Archaic period. One issue is a marked preference by Late Archaic peoples for the utilization of durable, coarse-grained materials, notably quartzite (McLearen 1991:95) for stone tool manufacture. Also found with Savannah River points are large bifacial tools or knife forms, also typically flaked on quartzite (McLearen 1991:95).

Late Archaic sites dating from approximately 2,500 B.C. to 1,100 B.C. are common along the Lower James River, which appears to have been a focal point for settlement at the time. The Late Archaic also marks the time in which Native Americans began to exert significant influence on the local environment. Prior to this time, the ecological impact of the Native Americans living along the Lower James River was probably minimal. Late Archaic subsistence strategies and land use practices set the stage for ever increasing levels of human disruption and modification of the local ecosystems, a process which continues to this day. As such, the Late Archaic represents a critical juncture in the relationship between humans and the environment, both within the James River valley and the broader Middle Atlantic region. The changes of the period are critical to understanding all subsequent Native American cultural-ecological interactions. In this context, a more detailed examination of Late Archaic settlement patterns and subsistence practices is warranted.

Ecological factors have long been linked to the cultural changes seen during the Late Archaic period. The development of the Chesapeake Bay and Delaware Bay estuary systems was undoubtedly a major driver, and the focused utilization of these new and highly productive

estuarine environments played a significant role in shaping the subsistence and settlement practices of the period (Mouer 1990, 1991; Custer 1994; Dent 1995). In the Chesapeake Bay area, shell midden sites appear in toward the end of the Late Archaic, indicating the newly developed estuarine environments were gaining importance in the local subsistence systems (Potter 1993). A marked increase in site frequency is also observed during the early portions of the Late Archaic, suggesting both an overall population increase and population movements into new environmental zones (Turner 1978). Some sites in riverine and estuarine settings tend to be larger and more complex than during previous periods, suggesting a trend toward sedentism and organized resource procurement strategies (Johnson 1986). An intensive seasonal exploitation of anadromous fish runs is widely regarded as having played significant role in Late Archaic seasonal subsistence. In addition to intensively exploiting newly developed estuarine resources, Late Archaic peoples began to purposely modify local forest environments, particularly in floodplain settings. Fire was the main tool in this process, the aim of which appears to have been to disrupt climax forest conditions to enhance local biodiversity and to promote economically valuable early succession plant communities.

Klein and Klatka (1991) note that even though the Late Archaic stands as one of the most studied periods in Middle Atlantic prehistory, it remains one of the most poorly understood. Traits that have been traditionally viewed by researchers as defining the regional Late Archaic are “increased sedentism, population growth, an intensification of riverine and estuarine resource exploitation, a greater reliance on storage, and the participation in exchange systems and technological developments related to these trends” (Klein and Klatka 1991:142). While these trends are archaeologically observed across a broad geographic area, Klein and Klatka (1991) succinctly observe that most archaeologists recognize a considerable variation in the timings and the extent to which societies inhabiting the region participated in these developments. Thus, the resultant Late Archaic cultural patterns can best be thought as a patchwork or mosaic, that when viewed against a backdrop of both significant ecological changes and cultural adaptations to these changes, constitute the cultural dynamism characteristic of the period.

While this dynamism likely resulted in considerable variation among Late Archaic groups in the area, there are clear material culture trends that are readily discerned archaeologically. The most prominent of these is the adoption of large stone points typically manufactured on tough, coarse-grained material such as quartzite. In eastern Virginia, these tools most often closely follow the classic Savannah River form. Most researchers view the Savannah River type as having functioned as multi-purpose tools rather than purely a projectile point. Further, the preference of tough materials would appear to have functional implications. Other developments include the adoption of carved steatite (soapstone) vessels as precursors to ceramic technology. The transport of these heavy items from quarry areas in the central and western Piedmont throughout the region occurred within a developing system of long distance trade and exchange. The physical movement of these items over large distances is also indicative of a use of boats for transport, evidence of which is generally lacking for earlier times.

When examining the cultural changes of the Late Archaic, Mouer’s (1990) adaptive radiation model is worthy of mention. Stated in simplistic terms, this model presents the spread of Late Archaic life ways, represented by Savannah River material culture and settlement, through a focused orientation toward estuarine/riverine resources. These changes would have been coeval with and facilitated by the development and expansion of tidal estuaries and the stabilization of

inland floodplain environments brought about by sea level rise. This model can neatly accommodate but is not necessarily predicated on a south to north and coast to inland movement of people/life ways/material culture traits.

In summary, the Late Archaic was a period of complex cultural change. Major defining traits include ongoing population growth, increasing sedentism, and intensification of local food resource exploitation. This intensification is evidenced archaeologically by the advent of below ground storage, and the construction of large, communal cooking hearths. Another characteristic of the period is the rise of trade and exchange networks that are archaeologically recognized through the occurrence of finished goods and semi-raw material many hundreds of miles from their source areas. The clustering of growing populations in select locations, resource competition, and migration can also be considered as both causal factors and outcomes of the cultural changes that define the period.

The Early Woodland Period (1,100 – 500 B.C.) (3,100-2,500 B.P.)

The beginning of the Woodland Period has traditionally been defined by the adoption of ceramics manufacture. In Virginia and across the greater Middle Atlantic region, the Late Archaic to Early Woodland transition appears to have been gradual. Material culture traits slowly blend between the two periods and no major shifts in subsistence practices is reflected in the archaeological record. However, while Late Archaic sites are common in the Coastal Plain of Virginia, particularly along the Lower James River, sites dating to the Early Woodland are relatively rare. Subsistence during the Early Woodland relied on hunting and the exploitation of wild plant food sources. Coastal Plain Early Woodland people were less than sedentary and likely occupied a variety of site locations during seasonal settlement movements. Evidence of formalized horticultural practices is generally lacking.

In much of eastern North America, the Early Woodland saw the rise of elaborate mortuary ceremonialism and the expansion of trade networks that facilitated long-distance movement of exotic stone and other coveted materials. The best known of the Early Woodland cultures is Adena. The Adena culture was centered in Ohio but their influence extended throughout the near Midwest and into parts of the Northeast and Middle Atlantic regions. Adena practices included the construction of large earthen burial mounds and the inclusion of exotic trade items as grave goods. However, little of the Adena influence seen in the interior parts of the Middle Atlantic and Appalachian states seems to be expressed in eastern Virginia. No evidence burial mounds or other monumental architecture has been documented in the James River watershed east of the Fall Line.

Prior to the Late Archaic, Native American peoples in Virginia are assumed to have been organized as egalitarian bands. While peoples lived in small groups, they appear to have shared a common culture with other widely dispersed groups with which they had little or no direct contact. The changing life ways reflected in the archaeological record of the Late Archaic period probably also included the development of some level of social and political stratification. To what degree social stratification was prevalent in regional Late Archaic and Early Woodland societies is a matter of debate among archaeologists. Typically postulated is the “Big Man” model of social hierarchy. Under this system, societies are less than fully egalitarian but are not ranked or stratified. Certain individuals or “Big Men” could rise to prominence through force of

personality, achievement, and largesse. The status gained by these individuals would allow them coordinate communal activities and exert influence on group decision making. Their position of influence also probably allowed them preferential access to coveted exotic items and raw materials made available through the long distance trade networks of the time, which in turn enhanced their prestige.

The Middle Woodland Period (500 B.C. - A.D. 1000)

The Middle Woodland in eastern North America was a culturally dynamic period but one that remains poorly understood. Population growth, which had been ongoing since the Late Archaic, likely accelerated. Formal horticultural practices appeared to have been near universally adopted by the end of the period. Settlement practices were varied. Many archaeological sites of the time represent very short-term encampments while others appear to have been more intensively occupied.

One aspect of pan-regional Middle Woodland cultural attributes that can be observed in the archaeological record of the Lower James was the refinement and a maximum expression of long distance trade networks that first arose during the Late Archaic. Items making their way into Virginia included cold hammered copper from the upper Midwest, shell from the Gulf of Mexico and high quality Ohio chert, chalcedony and other stone for tool manufacture. Locally, there appears to have been a particularly active trade in rhyolite obtained from sources in the Maryland/Virginia Blue Ridge. Use of Blue Ridge rhyolite in the manufacture of Middle Woodland projectile point forms is well known along the Western Shore of the Chesapeake (Potter 1993) and the material appears with some consistency on Middle Woodland sites along the Lower James River tributaries (McLearen 1987).

Material culture patterns in eastern Virginia were complex and are difficult to understand archaeologically. A variety of local ceramic styles are typically found on Lower James River (Mouer and McLearen 1989). Against the backdrop of these local ceramic traditions, one sees the widespread use of Mockley, a distinctive shell-tempered ware found from northeast North Carolina to southern New Jersey.

The largest technological change of the period was the adoption of the bow and arrow. The manufacture of small stemmed/notched points beginning around A.D. 200 appears to be related to that innovation in weapons technology. The exact origin of the bow and arrow in North America is uncertain. However, prior to the Middle Woodland, use of the atlatl, a notched spear-throwing device, had remained the primary method of delivering projectile weapons. Some formal plant cultivation was likely undertaken by the Middle Woodland. This includes tropical imports such as maize, appears throughout much of eastern North America after around A.D. 200. However, stable isotope studies suggest that while present archaeologically, maize contributed only minimally to Native American diets until Late Woodland times (Smith 1992).

The Late Woodland Period (A.D. 1000 – 1607)

The Late Woodland period along the Lower James is defined by the wide scale adoption of maize horticulture, the advent of semi-permanent village settlement, and the rise of stratified, politically complex societies. While these changes appear fairly dramatic and sudden, they are likely attributable to conditions and processes that have been operative for some time. These

factors likely included ongoing population growth, and a steadily increasing reliance on plant husbandry. However, the impact resulting from the introduction of tropical cultigens, particularly maize, cannot be understated. Principal among these impacts was the ability of tropical cultigens to generate food surpluses. Maize provided food for storage, and in turn played a significant role in a developing system of social and economic control being forged by a rising social/political elite.

The beginning of the Late Woodland saw a reduction in, and in some cases the collapse of long distance trading networks that had been operative since Late Archaic times. In the Virginia Coastal Plain, some non-local materials such as copper and shell still appear in archaeological contexts. However, trade was more limited than in previous times, and access to exotic goods was likely tightly controlled by high status individuals (Potter 1993). Rather than functioning to maintain relations between geographically distant but culturally similar groups, as was probably the case during earlier times, Late Woodland trade in exotic items should perhaps be seen as both resulting from and constituting an expression of political and economic power.

Temporally diagnostic artifacts of the Virginia Coastal Plain Late Woodland include Townsend Series ceramics and later Gaston and Roanoke Island wares. Potomac Creek ceramics occur as a minority type along the north bank of the James (Egloff and Potter 1982). The bow and arrow appears to be in universal use during this time and small triangular stone points become ubiquitous. Other aspects of Late Woodland material culture include small ground stone adzes, chipped stone knives, shell beads and cold hammered plate copper. Wood dugout canoes were the primary boat form, and these vessels were extensively employed by Native American groups along the Lower James.

Settlements consisted of semi-permanent villages located mostly along the river bank or a short distance up secondary drainages (Roundtree 1989). Swidden horticulture was actively practiced, with maize, bean and squash constituting the primary cultigens. However, wild food sources, both plant stuffs and game continued to constitute large portions of Late Woodland diets. Villages were not fully inhabited year round. Rather, a majority of the residents periodically dispersed to satellite camps in order to exploit specific seasonally available food resources (Roundtree 1989; Davidson and Roundtree 1997).

The Contact Period (A.D. 1607 – ca. 1644)

The Lower James River was the focal point for the initial interaction between the English and Native Americans. The earliest formal contact between the two cultures occurred with the founding of the Roanoke Island colony in 1584. The venture ultimately failed and the English did not return to settle in the New World until the establishment of Jamestown in 1607. The founding of this first permanent colony defines the beginning of the Contact Period in Virginia. Native American - English relationships during the early years of the Jamestown settlement were characterized by an odd admixture of trade, political/military collaboration, and low-grade warfare. However, increasing English pressure for land and other antagonisms precipitated full-scale coordinated attacks by the Natives in 1622, and again in 1644. While the attacks of 1622 nearly resulted in driving the English from Virginia, the 1644 uprising was directed against a much larger English presence and was thus doomed to failure. Massive and bloody English reprisals for the 1644 attacks left the Native Americans in eastern Virginia defeated and

scattered. Some survivors fled to find refuge with groups to the south and west. The remaining population was moved onto treaty lands, while other took on the trappings of European culture and adapted to life on the margins of colonial Virginia society.

The Pre-Clovis Debate

The Clovis people are known to have spread across much of North America during the waning centuries of the Pleistocene. However, the paradigm of these late Ice Age hunters being the first humans to occupy the continent is coming under increasing scrutiny. A small but growing body of data point to a much earlier initial human settlement of the continent. The prospect of a “pre-Clovis” culture has become a heated topic of debate among archaeologists.

Over the last several decades, a number of scholars have begun to challenge the long-standing “Clovis first” paradigm. Their calls for recognizing the existence of a pre-Clovis culture were initially met with extreme skepticism and outright derision by much of the professional archaeological community. However, based on recent findings from a limited but growing number of archaeological sites, the concept of a pre-Clovis occupation of North America is gaining traction.

Radiocarbon dates and other chronometric evidence for a very early human occupation of North America have periodically surfaced since the advent of these techniques in the 1950s and 1960s. These findings, though tantalizing, were generally dismissed while being attributed to contamination, or a suspect contextual relationship between the assayed material (e.g. charcoal) and the artifact being dated. Evidence from a major, carefully controlled archaeological site excavation was lacking until Dr. James Adovasio published findings from Meadowcroft Rockshelter located in southwestern Pennsylvania (Adovasio, et al. 1977; Carlisle and Adovasio 1982). The excavations recovered evidence for human occupation within sealed levels that yielded radiocarbon dates of between 19,600 to 13,230 years ago. Original publication of the findings ignited controversy that is ongoing. While the authenticity of the Meadowcroft Rockshelter radiocarbon dates is still being debated, other scientifically controlled site excavations have produced high quality data pointing toward a pre-Clovis occupation of North America.

Among the most convincing evidence comes from Monte Verde near the Pacific coast of southern Chile where Dr. Tom D. Dillehay of the University of Kentucky and Chilean archaeologists have been excavating since the 1980s. The well-preserved site has produced extensive evidence for long term encampments dating to 12,500 years ago. Period finds include tools, food residue, and traces of shelter locations. Dillehay has published extensively on Monte Verde in professional archaeological journals. However, the findings of the long term research project remain highly controversial. In this context, a blue ribbon group of archaeologists traveled to the site in Chile to inspect the site. The group certified the excavation techniques as sound and collectively endorsed the validity of the findings in *Science* (Gibbons 1997). The Monte Verde findings are highly significant as they place humans in southern Chile nearly a millennium before their presumed earliest migration across the Bering Strait land bridge, some 10,000 miles to the north.

Additional compelling evidence for a Pre-Clovis occupation has been uncovered in southeastern Virginia. The Cactus Hill site, located along the Nottoway River approximately 30 miles south

of the Rice Center, has gained international attention for its apparent pre-Clovis settlement. At Cactus Hill, McAvoy and McAvoy (1997) reported stone blade tools and large triangular projectile points along with the remains of a white pine-burning hearth, all below an intact Paleo-indian occupation surface. The hearth yielded a radiocarbon date of approximately 15,700 B.P. Subsequent excavations at Cactus Hill yielded additional convincing evidence for a pre-Clovis occupation, including stone tool forms atypical of Paleo-indian peoples found at the deepest levels of the stratified site, as well as supporting early radiocarbon dates.

Despite the robust nature of these findings, a large number of professional archaeologists remain skeptical of a pre-Clovis culture and are unwilling to embrace the concept based on a very limited number of site excavations. What is not contested, however, is that if pre-Clovis people existed in North America, their population must have been miniscule. Therefore, as intriguing as the prospect of a pre-Clovis culture is, the existing paradigm of Paleo-indian hunters sweeping across the post-Ice Age landscape of North America with their new and sophisticated stone tool technology, essentially remains unchallenged.

The Historic Period

Founding of Jamestown and the Virginia Company Period (1607-1624)

The Lower James River was the focal point of early English settlement in North America. In contrast to Puritan New England, the founding of which was steeped in religious sectarianism, the Virginia colony was established as commercial enterprise backed by investors in London. The Virginia Company of London was founded with the expressed purpose of establishing a settlement in the New World. Investors hoped that the undertaking would yield precious metals or other valuables and turn a profit.

English settlement along the Lower James began with the establishment of Jamestown in 1607. While Jamestown was the core settlement during what would be known as the Company Period, other English outposts quickly sprang up. These consisted of individual fortified compounds scattered along the Lower James River shores. The Virginia colony suffered tremendously during these early years. Jamestown in particular, experienced appalling death rates from disease and malnutrition. Relations with the Native Americans were contentious, and can best be characterized as low-grade warfare, interspersed with periods of trade and collaboration. Mounting Native concerns over the growing numbers of English in their midst and their demands for food and land precipitated an all out insurrection. On the 22nd of March 1622, the Natives executed a series of coordinated surprise attacks which nearly succeeded in driving the English from the Lower James River. It is estimated that as many as half the colonists in Virginia were killed as a result of the uprising.

The Early Colonial Period (1625-1699)

The difficulties faced by the colony, including troubles with the Natives, staggering death rates, and the inability of the enterprise to make a profit led King Charles I to dissolve the company in 1624 and decree Virginia a royal colony. In the years immediately following the events of 1622, punitive military actions by the English established supremacy of the Lower James River and the

Natives were forced to accept their presence. The Natives rebelled again in 1644. By this time, however, the sheer numbers of English in Virginia doomed the revolt to failure.

Prior to its dissolution, the Virginia Company had begun the practice of granting lands to private individuals. This practice was expanded under the Crown's governance. Most of these initial grants were small, and given to individuals who were able to sponsor passages for themselves and others. In the following decades, an increasing percentage of colonists arriving in Virginia did so as indentured servants. These persons were brought to the colony in exchange for a period of servitude, typically seven years. After the specified period, the servant would be released and given a minor tract of land.

While the colonization of Virginia failed to yield the mineral riches that the original investors had hoped for, the advent of tobacco cultivation gave the struggling enterprise a much needed boost. John Rolfe, better known for his marriage to Pocahontas, is credited with founding Virginia tobacco cultivation by introducing a mild-smoking variety from the Caribbean. The second quarter of the 17th century saw a boom in Virginia tobacco. Settlement of the Lower James River expanded rapidly as land was claimed for cultivation. Cured tobacco was shipped to London and sold at premium prices to ever increasing numbers of addicted users in England and across Europe.

By the mid 17th century, the Lower James River had been transformed from a frontier outpost to a network of thriving rural communities. Although tobacco remained the economic mainstay, the colony was bolstered by the development of indigenous enterprises, including gristmills, blacksmith shops, tanneries, breweries and taverns. English settlement spread to the lower York River by the 1630s. However, the Falls of the James remained the western, upriver frontier of Virginia until the end of the 17th century.

During the second half of the 17th century, select individuals were able to amass considerable amounts of land through grants and other means, and used these holdings to enhance their position in the colony. Following the Cromwellian Revolution, Virginia witnessed an influx of loyalists who brought with them money and a tradition of landed aristocracy. Known as "Cavaliers" many of these individuals were rewarded land and offices of power in Virginia after the Restoration. Over time, these families consolidated their lands, wealth, and power to form the basis of the aristocratic plantation system that defined much of the 18th century Virginia life.

The Colonial Golden Age (1700 – 1775)

In 1699, proposals were put forth to move the capitol from Jamestown to Middle Plantation, which was renamed Williamsburg. The newly laid out town soon grew into the social and commercial, and well as governmental center of Virginia. The first half of the 18th century was not only the golden age of Virginia plantation life but also marked the zenith of the Lower James River in its leading role in the colony. Wealth was concentrated within a small elite who built stately mansions along the riverfront. These landowners had amassed their holding as much by political office and influence, as through enterprise. Although wealth and power was concentrated within this agrarian elite, an increasingly prosperous merchant class arose in Williamsburg, Hampton, and other developing Tidewater towns.

Even as Tidewater plantations were the most prominent feature on the landscape, the majority of Virginians were of far more modest means, living as yeoman farmers, tradesmen, or slaves. A tragic and inescapable historical fact is that throughout the 18th century, the Virginia economy came to rely on ever increasing amounts of slave labor. Enslaved Africans not only worked the large plantation fields, but were also rented out to budding industrial concerns in Williamsburg and in the other nascent urban centers of the time. Other slaves worked as tradesmen and skilled laborers.

Settlement of the Piedmont began in 1699 when the French Huguenots established an outpost above the Falls. In the following decades, Virginia rapidly expanded westward. Settlement initially centered along the James River but soon encompassed the Piedmont interior. In 1733, the cities of Richmond and Petersburg were founded at the Falls of the James and Appomattox rivers. With the ongoing settlement of the Piedmont region, Richmond and Petersburg began to serve as transshipping points at the upper limits of navigation. Richmond, however, remained a relatively minor town until after the American Revolution.

During the years leading up to Independence, the Lower James functioned as the principle avenue of commerce in the region. Sailing vessels plied the river, docking at plantation wharves and the port of Bermuda Hundred just above the mouth of the Appomattox. Ocean going ships carried tobacco to England, returning with manufactured goods and luxury items, as well as rum and sugar from the Caribbean. Southern Virginia also exported pitch, tar and turpentine, collectively known as naval stores, back across the Atlantic. These materials were of critical strategic importance to the English ship building industry and to sustaining the rising global power of the Royal Navy.

The American Revolution and Federal Period (1776-1820)

Final victory in the American Revolution was achieved at Yorktown located in the middle reaches of the Virginia Peninsula. However, relatively little military action took place along the Lower James River. Some forces from both sides traversed the area but no significant engagements occurred. While many of the revolutionaries who would come to lead the colonies to independence hailed from Virginia, major landowners along the Lower James were split by the conflict, with many remaining, at least tacitly, loyal to the Crown. At the outbreak of the Revolution, Richmond was a small hamlet at the base of the Falls. The Tidewater port cities, the capitol Williamsburg, and the major James River plantations continued to serve as the political, economic, and social centers of the colony. This situation changed rather abruptly following American victory. In the early Federal Period, Richmond expanded rapidly as new industries were established to take advantage of the ample waterpower offered by the Falls of the James. Growth of the Piedmont region and the westward expansion the country's frontiers following Independence greatly increased traffic and commerce on the upper James. Richmond's role as the main break of bulk point for commerce with the inland areas continued to gain importance as the new United States grew and prospered.

The Antebellum (1821 -1860)

The Antebellum witnessed the ongoing industrialization of Richmond along with significant growth in the city's population. In rapid succession, new industries were established along the

north and south banks of the James. Flour mills processed grains from both the Piedmont region and points east of Richmond. At the time, western Virginia was found to contain good deposits of iron ore and the great forests in the region were tapped to support a growing charcoal-fueled iron industry. Pig iron was floated down the James in boats to be worked into finished goods in Richmond's newly established foundries and rolling mills. These industries would play a critical role in the Confederacy's war effort during the coming conflict. The James River and Kanawha Canal pushed westward during these years, further strengthening Richmond's commercial connection to the interior parts of Virginia. In the years just prior to the outbreak of the Civil War, Richmond had grown into one of the largest flour producing centers in the United States. The Lower James River remained a vital transportation link to points east and the river continued to support both ocean going vessels and busy local traffic. Even as Richmond experienced burgeoning growth, areas around the Rice Center remained rural. Although many of the large plantation properties along the river continued to be worked, political and economic power had long shifted to the new urban areas in Tidewater and Virginia's growing capitol at the base of the Falls.

Civil War and Reconstruction (1861-1880)

The Lower James River played an important role in the Civil War. In the face of superior Union naval power, the Confederacy abandoned the Tidewater ports early in the conflict and withdrew up the Virginia Peninsula to the heavily fortified capitol. In the spring of 1862, the Lower James River became a focal point in the conflict when General McClellan moved the Union Army up the Peninsula in an attempt to take Richmond. The Union advance was halted in series of engagements which became known as the Seven Days Battle. Following these clashes, McClellan withdrew his forces to Berkeley Plantation where they encamped under protection of Union gunboats. The bulk of these forces were withdrawn six weeks later.

The area of the Rice Center remained under Federal control for the balance of the conflict and was thus spared additional fighting. However, Union control of the James ended at Drewry's Bluff, where well-constructed emplacements of powerful naval cannons blocked the river. In May of 1862, Union warships probed these defenses and were repelled so decisively that Confederate control of the James leading into Richmond was not again challenged until the city was abandoned during the final week of the war. The James River Squadron, consisting of four heavily armed ironclads, complimented the Confederate defense of the river between Richmond and Drewry's Bluff. The only other significant naval engagement occurred in January 1865 when the James River Squadron steamed downriver in a failed attempt to destroy the Union supply base at City Point.

Following the withdrawal of McClellan's forces in the summer of 1862, relatively little military activity occurred along the north side of the James River. In 1864, General Grant moved his Army across the James just downstream from the Rice Center during his advance on Petersburg. City Point, located on the south bank of the river near the mouth of the Appomattox, had become the main Federal supply point for operations in the area. In 1864, the supply base at City Point grew exponentially as the Union advance on Petersburg stalled and the opposing armies became mired in an extended period of trench warfare.

Ships docking at City Point kept the tens of thousand of Union troops supplied for the duration of the eight month long Siege of Petersburg. Following the Federal breakthrough and the capture of Petersburg in April 1865, Richmond had to be abandoned. The conflict ended a short time later with General Lee's surrender at Appomattox Court House.

Large portions of Richmond were destroyed by fire during the Confederate withdrawal. However, the rural areas around the Rice Center remained unscathed. As was the case across most of the South, prominent landowners bankrupted by the war were forced to sell their holdings, often to investors from the victorious Northern states. During this time, Berkley Plantation's owners were forced to relinquish claim on their properties. Other major property owners were also ruined by the collapse of the Confederacy and large tracts of land along the Lower James were broken up and sold.

The early postwar years witnessed rapid rebuilding of Richmond and its industrial infrastructure, facilitated by Reconstruction policies and capital from Northern banks and businesses. During Reconstruction, prime farmland on the Lower James River terraces remained in cultivation, albeit often under new ownership.

Dawn of the Modern Age (1880-1899)

The last two decades of the 20th century brought unprecedented growth to the area as Richmond grew into a regional manufacturing and commercial center. Around the turn of the century, shipbuilding briefly flourished on the Richmond waterfront when the Trigg Shipyard built steel hulled vessels for both the US Navy and civilian service. Richmond also boasted foundries, rolling mills, assembly plants, and other industrial concerns. Tobacco, however, remained an economic underpinning of the city's economy.

Tobacco processed and packaged in Richmond was grown primarily in the southern Piedmont. Farmland along the Lower James River, which had been the center of tobacco production early in colonial period, had long transitioned to other crops. These areas remained rural and relatively thinly populated during these last decades of the 19th century. As Richmond continued to grow, many rural Virginians, including those living on farms and small settlements along the James, gravitated to the city to find work. The Late Antebellum period also witnessed the development of the modern railway system. The trail bed of the defunct James River and Kanawha Canal was used by a predecessor of the Chesapeake and Ohio (C&O) Railway to build a water level rail line along the upper James River. By 1881, the C&O line was extended from Richmond down the Virginia Peninsula to the deepwater port of Newport News. The importance of the James as a transportation artery diminished significantly with the completion of the C&O line. Passenger service, mail, and most freight quickly transitioned to rail. The silting in of the river channel and a rapid increase in size of ocean going vessels of the day spelled the end of Richmond as a major port city. While Richmond maintains a deepwater port to this day, most vessels plying the James by the last decade of the 19th century carried only minor goods traffic between local communities.

Early 20th Century (1900-1929)

The years spanning the turn of the 20th century is sometimes referred to as the rise of the modern era. This era is defined by advent of the internal combustion engine and automobile, aviation,

telephone, radio, and the implementation of universal primary education. A material culture hallmark of the times was the mass production of a wide range of consumer goods and wares, which for the first time made these items available to virtually every segment of society. Furthermore, the mass production of internal combustion engines and other technological advances allowed for the mechanization of farming. In the preceding decades, only the wealthiest farmers could afford steam powered tractors and equipment while the remainder continued to rely on draft animals for traction. In general, the first two decades of the 20th century were prosperous times for much of the United States. The Lower James River shared in this prosperity. Although the Lower James River shores remained rural and agricultural, the automobile, telephone, radio, and a growing network of paved roads drew these rural areas ever closer to Richmond and the cities of the Tidewater region, ending the relative isolation of all but the most remote farms and villages of the Virginia Peninsula.

Great Depression and World War Two (1930-1945)

The Depression years brought changes to the rural areas along the Lower James River. Much of the rural south experienced an out migration as significant segments of the population gravitated to urban areas or moved west in search of relief from the economic hardship. World War Two brought a final end to the Depression of the 1930s. The nation's economic might was reawakened and industry retooled and expanded to meet wartime demand. From a land use perspective, the war brought little change to the Lower James River. However, from a demographic standpoint, rural areas in the region saw some significant number of persons leave join the Armed Forces, or to find factory work in Richmond and Norfolk, the Newport News shipyard, the Norfolk Naval Base, and supporting businesses and industries.

Modern Era (1946- Present)

The immediate post war era saw relatively little change along the Lower James River in the vicinity of the Rice Center. Areas north of the river remained predominantly rural, with a mix of medium sized farms, small crossroads communities, and individual rural home sites. Modern agricultural production in the area was, and continues to be characterized by soy, winter wheat and corn. Peanut and cotton was grown in the counties south of the James, mostly in areas east and downstream of the Rice Center. The greatest changes occurred in the Hopewell area with the growth of the chemical industry. This industry, which rose to prominence during World War Two, developed exponentially with the advent of commercial synthetic materials production.

As everywhere in the United States, the automobile had a profound impact on the post-war years, both in societal and economic terms. In the 1950s and 1960s, home sites sprang up across the area as car travel allowed people to commute to Richmond or Williamsburg to work. Intercity travel quickly shifted from rail to road. Route 5, which had long linked Richmond and Williamsburg, became a byway following the four-lane improvement of Route 60. In turn, this main travel artery down the Virginia Peninsula was eclipsed by the construction of Interstate 64. A rising standard of living and affordable automobile travel led to a boom in tourism across the area. Major attractions include the preserved plantation homes, restored Colonial Williamsburg, Jamestown Settlement, Yorktown, and Civil War battlefields. Today, these attractions form the core of Virginia's multi-billion dollar heritage tourism industry.

Section 6 Settlement and Land Use of the Rice Center

Introduction

The preceding Cultural Context section provided an overview of the 11,500-year human presence along the Lower James River. The following section focuses on settlement and land use practices within the Lower James River setting, from earliest prehistoric times to the modern period. Reconstruction of settlement practices draws on archaeological data, historical documents and contemporary records. This information is synthesized to provide a time line account of settlement and land use in the study area. Prehistoric period settlement and land use is discussed within the context of the Lower James River setting. Historic period settlement and land use is presented in the context of the Lower James River setting as well as the actual Rice Center lands, as available data allow.

Settlement and Land Use

Prehistoric Period

The Lower James River contains a wealth of prehistoric archaeological sites and a significant amount of excavation has been undertaken in the area. The following sub-section provides a review of locally documented prehistoric settlement and associated activity in the vicinity of the Rice Center.

The Paleo-indian Period (9,500 – 8,000 B.C) (11,500 BP. – 10,000 B.P.)

The Lower James River

Southeast Virginia is known as a “hot spot” for Paleo-indian settlement (McCary 1988, Turner 1989). Although no major Paleo-indian sites have been investigated along the Lower James proper, several important sites have been excavated within the adjacent Carolina Sounds drainage, most notably along the Nottoway River. One of the best known of these is the Williamson Site located in Dinwiddie County. A focal activity on the Williamson site was the surface quarrying of a high-grade chert for the manufacture of the distinctive fluted points characteristic of the period (McCary and Bittner 1978). This lithic source-driven type of settlement conforms to Paleo-indian settlement models developed by Gardner (1974, 1977) based on his work at the Thunderbird site complex along the Shenandoah River near Front Royal. These models hold that Paleo-indians were highly mobile and moved within a wide geographic range, periodically revisiting specific sites to procure a favored lithic material with which to replenish their sophisticated stone tool kits. A Paleo-indian occupation has also been investigated at the Cactus Hill site, better known for its purported pre-Clovis settlement (McAvoy and McAvoy 1997). Located along the Nottoway River in Sussex County, the Cactus Hill site appeared to have been occupied as a short-term hunting station. Stone utilized for tools at Cactus Hill were local in origin and included Williamson site chert (McAvoy and McAvoy

1997). In general, the Nottoway River area appears to have been intensively visited by highly mobile Paleo-indian groups and numerous Paleoindian sites have been documented along the Nottoway River and its tributaries (McAvoy 1992). Distribution of these Paleo-indian sites reveals a settlement pattern in which small encampment sites were located along low order drainages. Upland sites are fewer in number and appear to have been geared towards procuring quality material for stone tool production (McAvoy 1992).

The Early Archaic Period (8000 B.C. – 6500 B.C.) (10,000 - 8,500 B.P.)

The Middle Archaic Period (6500 B.C. - 2500 B.C.) (8,500 - 4,500 B.P.)

The Lower James River

Early and Middle Archaic site findings in the vicinity of the Rice Center generally conform to accepted regional settlement models. These models articulate a pattern characterized by low viability in site function and a short-term occupation span. Early Archaic and Middle Archaic sites have been documented in a variety of settings in the vicinity of the Rice Center, including the James River terraces at Shirley Plantation (Reinhart 1984) along interior, low order streams in (McLearen 1987) and across the intervening uplands (Blanton et al. 1992; Bowden 2000). In general, these site findings are consistent with short-term occupations within subsistence rounds geared towards the exploitation of a wide range of local food resources. Much of the stone used in tools production also appears to have been obtained locally. Quartzite and quartz cobbles, readily available along the riverbanks and minor streambeds, seem to have been the most common source. High-grade cherts and other non-local materials were also used, principally during the Early Archaic.

While Early Archaic and Middle Archaic sites are relatively common along the Lower James River, and occur in a variety of settings, no large stratified sites have been investigated. Regionally, the best archaeological view of the period comes from sites excavated along the Nottoway River. The Slade site (Egloff and McAvoy 1990) and the Cactus Hill site (McAvoy and McAvoy 1997) were both repeatedly occupied through much of prehistory. Further, the site landforms were subjected to aeolian (wind-borne) soil deposition which over time buried and separated the individual occupation levels. Both the Cactus Hill and the Slade sites yielded important archaeological data pertaining to the cultural sequences of the greater Middle Atlantic region. In general, the Nottoway River and Meherrin River watersheds are well known for extensive Archaic settlement. The western margins of the Great Dismal Swamp are also recognized as a “hot spot” for Archaic period sites.

Early and Middle Archaic peoples inhabiting in eastern Virginia were highly mobile, and lived by hunting and foraging in the deciduous forests and along freshwater rivers and streams that laced the Coastal Plain of the time. Site occupation spans were limited in duration and people moved from one location to another, probably within a regular seasonal round. Overall population level had increased since Paleo-indian times but remained a fraction of what it would be at the time of European contact.

Some highly localized opening of the forest may have been undertaken by Middle Archaic times, possibly evidenced by the appearance of crude, chipped stone axe heads on sites dating of the time. These items are perhaps more likely to have been used as grubbing tools rather than for

chopping. However, the degree to which Middle Archaic peoples modified the local forest cover, if at all, remains conjecture.

The Late Archaic Period (2,500 B.C.– 1,100 B.C.) (4,500 - 3,130 B.P.)

The Lower James River

The Late Archaic period is exceedingly well represented in the archaeological record of the Lower James River. Savannah River points and large quartzite chipped stone tools dating to this period are common finds along the James River shores, including on the Rice Center property. A multi-component site containing Late Archaic artifacts has been identified near the mouth of Kimages Creek just downstream of the Lake Charles dam (MacCord 1963). Evidence for Late Archaic encampments have been uncovered at Shirley Plantation (Reinhart 1984), on Jordan's Point (McLearen and Mouer 1993) and along the Appomattox in Hopewell (Stuck et al. 1997). More substantial, apparent base camp locations have been identified at the confluence of Baileys Creek and the James River in eastern Henrico County (Mouer 1986). Ephemeral encampment-type sites are found along the interior portions of low order interior streams feeding the middle Lower James (McLearen 1987, Egghart 2004). The use of quartzite cobbles obtained from streambeds and riverbanks in the manufacture of the large Savannah River points is near ubiquitous on local sites dating to this time period. A riverine settlement focus seems to be expressed in this site distribution. Also noted archaeologically is an apparent distinction between larger base camp type-sites and more short-term encampments, with the latter, smaller site types being commonly found in interior settings.

By the Late Archaic, Native American peoples had begun to significantly impact large areas of floodplain and bottomland environments. Regionally, Chapman et al. (1989) and Delcourt et al. (1986) provide data that suggest the floodplains of the Little Tennessee River were largely cleared by at least 4,000 B.P. This assessment is based on a dramatic increase in the use of cedar and pine for fuel on archaeological sites dating to the period. Use of these fuels over deciduous hardwood species suggests that the local forests were in less than climax state. Also noted by Chapman et al. (1989) and Delcourt (1986) is a sharp increase in charcoal contained in river sediment cores dating to the period.

For the Chesapeake Bay and its tributaries, Brush (1986) notes significant increases in metals present in bottom sediments over the last 4,000 years, Brush attributes these increases to extensive burning that released metals from the soils and vegetation to be incorporated in the river bottoms. While a dramatic increase in naturally occurring fires due to a drying climate or severe oscillations in seasonal rainfall could account for widespread natural burning, extant palynological and geomorphological data for the period do not support this scenario (Brush 1994, Stevens 1991). Synthesizing broad regional data, Stevens (1991) argues that human intervention, particularly the burning and clearing of floodplains, is reflected in geomorphologic record to include increased stream sedimentation, and localized aeolian soil deposition. Stevens also argues that the purpose of floodplain burning was to disrupt the climax forest cover to promote a variety of pioneering plant species that are known to have contributed to prehistoric diets.

In this context, Bruce D. Smith (1989, 1992) has convincingly argued that the promotion of certain pioneering, indigenous seed bearing species was undertaken in Eastern North America to

the extent that the region should be recognized as a loci for independent plant domestication. This model for the adoption of horticultural practices, also known as the Floodplain Weed Theory, has gained considerable acceptance among researchers working in the Middle Atlantic region. Smith postulates that the intensive exploitation of indigenous seed-bearing plants such as *Chenopodium sp.* and *Iva annua* developed into nascent horticultural practices long before the introduction of true cultigens. The propagation of these pioneering species depends on the physical ground disturbance well as the break up of the forest canopy. Smith (1989,1992) suggests that seasonal flooding along the rivers in Eastern North America originally provided this disturbance, and that an exploitive focus of these settings developed into nascent horticultural practices a millennium or more prior to the acceptance of tropical cultigens and development of fully horticultural lifeways.

Although direct evidence is lacking, Late Archaic peoples may have also have used fire for driving game. Archeological evidence suggests that a range of communal activities were likely undertaken and collective game drives would be consistent with overall life ways of the period.

In summary, a range of evidence suggests that Late Archaic peoples began to deliberately modify the local environment on a significant scale. The principal mechanism in this process was fire used to disrupt the climax forest cover, particularly in floodplain settings. These actions were undertaken within the context of an intensification of resource exploitation that likely included the active promotion of what are typically considered wild plant species. These Late Archaic land use and subsistence practices, which almost certainly took place on and around the Rice Center, set the stage for the development of semi-sedentary, horticultural lifeways, the full expression of which occurred in the centuries leading up to European contact.

The Early Woodland Period (1,100 – 500 B.C.) (3,100-2,500 B.P.)

The Lower James River

Sites dating to the Early Woodland are significantly less common in the area and there appears to have been a reduction in Native American settlement/use of the Lower James during this time. A few period settlements have been documented in the vicinity of the Rice Center. A minor Early Woodland occupation was identified at the Aignor #3 site along the headwaters of Roundabout Creek in Henrico County (McLearen 1987). Broader a field, excavations by the College of William and Mary Center for Archaeological Research (WMCAR) at Walkerton along the Mattaponi River identified a series of relatively short term, small group camps dating to the Early Woodland (Blanton and Linebaugh 1996). While Early Woodland settlement in the James River Coastal Plain appears to have been sparse and was characterized by short-term encampments, a different pattern is evident in the James River Piedmont. Mouer (1990, 1991) reported numerous very large, intensively occupied Early Woodland settlements centered on the James floodplains in Goochland and Fluvanna counties. In size and artifact density, these Early Woodland sites resemble the semi-permanently occupied village settlements characteristic of later periods (Mouer 1990). Researchers at Virginia Commonwealth University have also documented extensive evidence for extended term Early Woodland settlement along the North Fork of the Shenandoah River at Front Royal (McLearen 1991).

In summary, Early Woodland sites in the Lower James River vicinity are relatively rare (Mouer et al. 1980, Bowden 2000). Land use practices of the time are unclear. Those sites that have been

identified and studied appear to have had occupations that were limited in nature and were geared to general hunting and foraging activities. The vicinity of the Rice Center may have only infrequently been visited by Native American peoples, with the major James River settlements concentrated on the expansive Piedmont floodplains just above the Falls.

The Middle Woodland Period (500 B.C. - A.D. 1000)

The Lower James River

In contrast to the preceding period, extensive Middle Woodland settlement of the Lower James River setting has been documented. On the north side of the river, numerous small Middle Woodland sites have been identified along minor streams that feed into the James. Several such stream side sites are in proximity to the Rice Center (Mouer 1986a, 1986b, McLearen 1987). The exploitation of wild plant food resources appears to have been a focus on these encampment-type sites. Two Middle Woodland period campsites were extensively investigated along Two Mile Run in eastern Henrico County (McLearen 1987). The physical setting of these sites is directly analogous to the section of Kimages Creek on the Rice Center property. Artifacts recovered from the Aignor #3 and Aignor #9 sites consist almost entirely of ceramic sherds, with few or no chipped stone tools or weapons present. A very large number of cobble hammering/grinding tools was also found. These findings suggest that the processing of plant resources, rather than hunting was the primary site activity (McLearen 1987). Carbonized seed remains recovered from these sites represent species that require open environs, indicating that the site was at least partially cleared during the time in which it was occupied (McLearen 1987).

Middle Woodland sites have also been documented in analogous Lower James River tributary settings near Williamsburg (Hunter et al. 1993). These small sites appear to have functioned as generalized, resource exploitive camps. Additional streamside encampment sites investigated by the College of William and Mary Center for Archaeological Research (WMCAR) in the same area appear to have had a more specialized function. In September 1999, heavy rains associated with Hurricane Floyd caused the earthen dam holding Lake Powell to fail, exposing land surfaces that had been flooded by the impoundment. The sites were situated on stream terraces of Mill Creek, a minor, second order tributary of the James River. Sites 44JC1052 and 44JC1053 were investigated by WMCAR staff (Gallivan and Blouet 2001), and demonstrated to contain numerous rock hearth features. One very large example was interpreted as having been employed in the processing (roasting) of tuckahoe root (Gallivan and Blouet 2001). The preponderance of hearth rocks and ceramic sherds and relative scarcity of stone tools/debris on these sites mirror the findings made by Virginia Commonwealth University archaeologists on Middle Woodland streamside sites in Henrico County (Egghart 2004).

A significantly different pattern of Middle Woodland settlement is evident on the south bank of the James, where several very large Middle Woodland sites have been studied. The most intensively occupied of these sites is Maycocks Point, located at the mouth of Powells Creek a few miles downstream from the Rice Center. The site was investigated by Ben McCary, Norman Barka, and students and staff from the College of William and Mary during the 1970s. Maycocks Point appears to have been intensively occupied for extended periods of time, perhaps year-round. The Hatch Site is located a short distance up Powells Creek from Maycocks Point. The site was thoroughly excavated by Leverette Gregory and a dedicated group of volunteers.

Although it is better known as a Late Woodland village location, the Hatch Site was also intensively occupied during the Middle Woodland period.

These large Middle Woodland settlements stand in contrast to the relatively short term encampments documented north of the river. Traditionally, the occurrence of such divergent types of occupations would be interpreted as evidence for a dichotomous, base camp/satellite camp settlement pattern. These models typically postulate that people dispersed from a primary, longer-term occupation loci, to short-term outlying camps in order to hunt or exploit specific seasonal resources. However, the functional relationship (if any) between the streamside encampments north of the James and the much larger sites located along the south bank remains undetermined. The encampments along the minor streams north of the James may indeed represent satellite exploitive camps associated the major Middle Woodland site locations on the opposite bank. Alternatively, it is also possible that the minor interior streamside sites represent the primary settlement mode north of the James, with the river constituting a cultural as well as physical boundary that separated disparate groups with divergent settlement practices.

In regional context, recent archaeological evidence suggests that an active modification of the local forest environment was ongoing during much of the Middle Woodland. In the Delaware Coastal Plain, sites dating to the Middle Woodland are well represented in the archaeological record. Intensive Middle Woodland settlement and land use along intermediate order drainages that traverse the Delaware Coastal Plains appears to have entailed significant manipulation of the local forest cover. Data generated from local paleo-environmental research sponsored by the Delaware Department of Transportation (Kellogg and Custer 1994) suggest that an active modification of the local forest cover occurred post circa AD 0. Specifically, Brush's (1994) analysis of St. Jones River sediment cores show a dramatic, 400 percent spike in charcoal for samples dating between 2000 and 1500 years. This spike in charcoal and the stratigraphically congruent pollen profiles are interpreted by Brush as evidence for frequent fires but with these events occurring within an overall moisture regime not significantly different than today's (Brush 1994:90-91). The dramatic increase in charcoal in the St. Jones and other Delaware river sediment cores is seen as a result of the purposeful burning floodplain areas. The principal driver for this activity would have been to disrupt the climax forest cover to facilitate the establishment and renewal of economically valuable succession communities.

Minor tracts of forest may have been cleared by downing mature trees using fire. Well known findings on prehistoric sites excavated in the Delaware Coastal Plain are the traces of very large filled disturbances. These features, which often exhibit a "D"-shaped or crescentic plan, resemble tree throws but also have a trench-like gouge on one side. Over one thousand of these archaeological entities have been documented on various prehistoric sites in Delaware. Egghart (2005) presents these D-shaped disturbances as the physical trace of tree fall that have been induced to occur. In this scenario, grubbing was undertaken around the base of a mature tree and the exposed roots burned through, causing the tree to fall. Given the sandy unconsolidated nature of the Delaware Coastal Plain soils, this practice could be employed to disrupt significant areas of climax forest with relatively little effort.

On the north side of the James, the procurement and processing of plant foods was a major activity on interior streamside sites (McLearn 1987, Egghart 1989, Gallivan and Blouet 2001, Egghart 2004). As such, the extensive Middle Woodland use of interior streams and their

attendant minor floodplains may have been a response to the lack of James River floodplains, which had been inundated by sea level rise. Some modification of the local forest cover appears to have been undertaken as evidenced by the ethnobotanical remains recovered from archaeological site excavations. This clearing may have been limited to the immediate occupation site area. Although a focus on plant food exploitation is strongly evident on some of these sites, they were occupied as part of a larger seasonal settlement round geared to exploiting a variety of resources through hunting, fishing and intensive foraging. The latter activity may have included an ongoing promotion of certain plant species in and around occupation loci; a practice that blurs distinction between the gathering of purely wild foods and the active horticulture of the succeeding Late Woodland period.

The Late Woodland Period A.D. (1000 – 1607)

The Lower James River

In a regional context, the Late Woodland period is defined by development village settlements, the adoption of formal horticulture, and the rise of complex, ranked societies. By the time of European contact, much of eastern Virginia was politically united under the Powhatan Chiefdom. Occupation of semi-permanent villages along the major rivers constituted the primary settlement mode of the time. Although the Late Woodland peoples grew corn, beans and other cultigens, wild food resources continued to play a major role in their diets. During various times of the year, Late Woodland peoples dispersed from their main village locations to smaller camps in order to hunt, fish or collect seasonably available plant resources. In the Middle Coastal Plain, these outlying sites were typically located along interior drainages. Late Woodland campsites of this type have been documented along Four Mile Creek (Mouer 1986) and Two Mile Creek (McLearen 1987) in eastern Henrico County, on Bull Hill Run in Prince Georges County (Egghart 1989), and along minor drainages in the Williamsburg area (Hunter et al. 1993; Gallivan and Blouet 2001). Major Late Woodland village settlements that have been archaeologically investigated along the middle reaches of the Lower James include Jordan's Point across the James from the Rice Center (Mouer et al. 1992, McLearen and Mouer 1993, 1994) and Governor's Land at Two Rivers (Hodges and Hodges 1997) located at the confluence of the Chickahominy and James.

Communal game drives utilizing fire were undertaken by Late Woodland peoples. Citing contemporary sources, Roundtree (1989) describes how Late Woodland Native Americans drove game into natural constrictions, over bluffs or against shorelines where they would be ambushed by waiting hunters. The Rice Center topography provides all the elements needed for such a game drive. The Western Terrace becomes progressively narrower towards the river shore, at which point it drops steeply to the water, while the two other sides are defined by deeply entrenched stream courses. The topographic configuration of the Rice Center lends itself extremely well to a communal hunting technique by which deer would be driven from interior areas by fire and other means toward strategic choke points along the river. In focusing the movement of fleeing game, hunters could be given an opportunity to take the animal, either along the river shore or from canoes when the fleeing deer entered the water.

Prehistoric Settlement of the Rice Center

Relatively little archaeological work has been done along the north bank the James River in the immediate vicinity of the Rice Center. However, based on existing understanding of prehistoric settlement of the Lower James setting, and drawing on the limited archaeological research and observations that has been undertaken in an around the Rice Center itself, it is possible to articulate a reasonable approximation of human settlement prior to the arrival of the English early in the 17th century.

It is highly unlikely that any Paleo-indians ever lived on the Rice Center lands. Human populations at the time were very small and no evidence of Paleo-indian occupation has been uncovered in analogous settings anywhere in the vicinity. By contrast, it is almost certain minor camp sites dating to the Early Archaic and Middle Archaic are present on the property. These types of occupation are well documented in the area and typically occur on the high terraces overlooking major the river as well as along the minor tributary streams where suitable landforms are present. Some of these camp-type occupations were likely very short term and left relatively little behind in the way of archaeological traces. The limited numbers of stone tool manufacturing chips as well as hearth fire stones that have been noted/found across the Rice Center (Bennet: personal communication 2004; Monroe 2006) likely date to these periods. It is possible that more substantial period occupations may have occurred along the former James River floodplain which now lies inundated.

Stone tool forms known to date to the Late Archaic have been found scattered along the James River shore just downstream from the former Lake Charles impoundment (Bennet: personal communication 2004). The mouth of Kimages Creek was likely occupied intermittently during much of this period. Confluences between the tidal James River and its tributary streams would have been strategically important locations from which to exploit the rich natural resources offered by the newly developed estuarine environments. Such resources likely included anadromous fish. These Late Archaic period camps in the area may have been located on low, river/stream fronting terraces that have been lost to sea level rise. It is also possible that the artifacts on the James River beach originated on the slightly higher terrace overlooking the confluence. This is the recorded location of two apparent Woodland period archaeological sites (MacCord 1963; Monroe 2007) that are likely to have been occupied during the Late Archaic period as well. The VDHR site files suggest that one site is a (Late Woodland?) village and the second contains a shell midden. However, this information is unsubstantiated and seems to have been based on cursory field observations (MacCord 1963). Early Woodland sites appear to be rare along the Lower James River. It would be a reasonable assumption that the Rice Center proper was not inhabited during this time. Investigations have been carried out by the William and Mary Center for Archaeological Research along the river fronting portions of the Western Terrace (Monroe 2007). These investigations uncovered artifact evidence of prehistoric occupation of the bluff, including a weathered ceramic sherd of undetermined (Woodland) age. The artifact most likely dates to the Middle Woodland period. Middle Woodland campsites may also be present along Kimmage's Creek, provided suitable landforms exist.

To complement the archaeological data from Late Woodland sites, early settlers and explorers left detailed accounts of Native American life in eastern Virginia. In the following subsection The Lower James in 1607, these entho-historical descriptions are synthesized with

archaeological findings to portray Native American life ways and the landscapes witnessed by the first Englishmen to arrive in the New World.

The Lower James in 1607

Scholars of Virginia's culture history are fortunate to be able to draw on a wealth of primary sources detailing Native American life at the time of European contact. The establishment of the Jamestown colony in 1607 initiated a nearly 40-year period of interaction between the new arrivals and the indigenous inhabitants of the region. During this time, several intrepid individuals traveled throughout eastern Virginia making contact with Native American groups and detailing their lifeways. The most well-known of these is Captain John Smith, whose New World exploits are colorfully chronicled in his work *The Generall Historie of Virginia, New England and the Summer Isles* (1624). Smith is known to have been an ardent self-promoter, and his Virginia adventures are likely to have been somewhat embellished. On the other hand, Smith was an astute observer of the geography, natural phenomena, and peoples he encountered during his travels. Other published accounts include *A Historie of Travel into Virginia Britanica* (1612) by William Strachey. These and other period sources have allowed researchers to portray a detailed picture of Native American life along the Lower James River at the time of European contact. Ben McCary (1978) first synthesized these primary sources into an ethnohistorical reconstruction of the region's Native American life with the publication of *Indians of Seventeenth Century Virginia*. More recently, Helen Roundtree (1989) produced the seminal work *The Powhatan Indians of Virginia*. The following description of Native American settlement and land use practices draws largely on these two excellent ethnohistorical compilations, as well as archaeological work undertaken at Contact period and Protohistoric sites in the area (Mouer et al. 1992, McLearn and Mouer 1993, 1994, Hodges and Hodges 1997).

When the first Englishmen arrived at Jamestown, various Native American groups living in eastern Virginia were amalgamated into what is referred to as the Powhatan Chiefdom. In the preceding decades, Chief Powhatan had united the various groups living in the Virginia Coastal Plain into this single political entity. Powhatan's domain was held together by a dynamic system of kinship, military alliance, coercion, and tribute. Comprised of approximately 30 named tribes, the Powhatan Chiefdom occupied an area extending roughly from the lower Potomac River, south to the Dismal Swamp, with the Fall Line marking its western limits.

The Powhatan Chiefdom was a ranked society. Individuals occupied socio-politically reinforced positions of power, status, and wealth. In this system, Powhatan society was roughly divided into: 1) a small political elite; 2) a large body of commoners; and 3) a bottom caste consisting of war captives, refugees, and various other low status individuals. In addition, shamans and religious functionaries appear to have occupied a unique station. Some vertical mobility was possible through marriage and individual achievement, particularly in the field of battle. The degree of control that Powhatan could exert on the constituent tribal groups varied, and was dependant on geography and other factors. Groups along the (southern) Potomac River shores seem to have been more loosely aligned with Powhatan, and their inclusion in the chiefdom may have been voluntary in exchange for a military alliance to help protect them against hostile groups to the north. The Chickahominy, whose lands were located near the

geographic heart of the Powhatan Chiefdom to include the vicinity of the Rice Center, appeared to have enjoyed a significant degree of autonomy.

A system of tribute was central to the workings of the Powhatan Chiefdom. Tribute flowed from the constituent groups to central locations controlled by Powhatan. This tribute included exotic trade items such as cold hammered copper, shell from the Gulf of Mexico, or rare types of stone for tool manufacture. However, foodstuffs were the common currency, with maize being most important. Tribute was used by Powhatan to support his court, and was redistributed back to his subject groups. These surpluses could be judicially dispensed to help bind allegiances or alternately, withheld to apply pressure to conform to the paramount chief's wishes.

The Powhatan Indians of eastern Virginia lived in semi-permanently occupied villages, typically located along major rivers or coastal water bodies. The main type of shelter consisted of a sapling framework bound together to form a tensioned dome, which was covered with bark mats and/or thatch. These houses were usually elliptical in form. Typical dimensions were between 20 to 30 feet in length with a width around 15 feet. Although referred to by English explorers as "towns", most settlements consisted of dispersed or loosely clustered individual structures scattered across a fairly large area. Maize horticulture played a significant role in subsistence and active and fallow fields were located around and within the village settlements. Cultivation of maize and other crops such as beans and squash relied on swidden practices. Forested areas would be cleared and burned in preparation for planting. Following several years, the open areas would be left to recover, and new areas cleared for plantings. Early succession plant communities characteristic of fallow or abandoned horticultural fields also likely had subsistence value.

Forested areas around village locations were opened by cutting away sections of bark around a standing tree in a process known as girdling. The girdled tree would soon die and drop its leaves and smaller branches, allowing sunlight to reach the ground (Roundtree 1989). Trees could also be downed by grubbing and burning around their base (Roundtree 1989). Soils were not tilled. Rather, digging sticks were used to prepare holes for individual plantings.

Hunting and fishing continued to play an important role in Late Woodland subsistence. Communal game drives utilizing fire were extensively undertaken. Native Americans in eastern Virginia periodically dispersed from the main village location to outlying encampments to hunt and to exploit seasonally available wild plant food resources (Roundtree 1989). Locally, interior stream settings appear to have been a favored setting for these outlying camps. Ethnobotanical evidence from local archaeological sites suggests that these encampment areas were at least partially open at the time (Egghart 2004). This may have been the ancillary result of repeated seasonal occupations of the same camp locations. Clearing of the forest cover may also have purposely been undertaken to maximize solar exposure for cold weather visits or to promote the growth of certain economically valuable wild plants that could be opportunistically exploited during return site visits.

Village locations would be occupied for perhaps 10 to 15 years, after which game and usable firewood in the area would have become scarce, and the easily cultivated soils depleted. The village would then be moved and reconstructed in a new location.

Historic Period

The Founding of Jamestown and the Virginia Company Period (1607-1624)

The Lower James River

The fort at Jamestown represented the largest English settlement along the Lower James River during the early years of the Virginia colony. However, by the second decade of the 17th century, numerous other outposts had been established along the banks of the river. These settlements took the name “Hundred” purportedly following Norman custom of dividing lands into districts that could muster one hundred fighting men. This would have been unattainable for most early settlements, and the term may have been intended to refer to one hundred total individuals. Given the high death rates and generally deplorable conditions prevalent in Virginia at the time, the latter would also likely to have been optimistic. English settlements in the first quarter of the 17th century were small, nucleated, and often enclosed by timber or split plank fortifications to protect them from Native attack. A recognized pattern of the time was for the English to occupy lands recently abandoned by the Native Americans. Not only did the settlers take advantage of previously cleared fields, but some of the same environmental factors made a particular tract attractive people of both cultures. Principally among these factors was a proximity to navigable water and arable soil.

Turner and Opperman (1993) divide Company Period settlement into four distinct phases. The first phase (1607-1610) had the English encamped at Jamestown and several other fortified locations upstream. The second phase (1610-1619) saw the establishment of a limited number, but well organized settlements at various locations along the Lower James River. This expansion was facilitated by the arrival of new leadership in Virginia and significant backing from England in the form of provisions, materiel and fresh colonists. The third wave of English settlement (1619-1622) occurred with a change in Virginia Company policy that allowed private land holding by individuals or small groups of investors. The same period marked the beginning of the tobacco boom and the resulting influx of indentured servants and the first enslaved Africans in the colony. The rate of settlement grew rapidly in these years, and the Native uprising of 1622 can be seen as a direct response to English encroachment. The fourth and final phase of Company Period settlement (1622-1624) was associated with the English military campaigns against the Natives following the 1622 uprising, during which time a large number of Indians were driven from their lands.

In all, the number of sites occupied during the Company Period was limited. Turner and Opperman (1993) estimate that there were no more than the 60 site locations in the Virginia colony, which at the time encompassed the Lower James River banks, and the southern tip of the Eastern Shore. This total includes aborted industrial enterprises and small individual homesteads that were occupied for only a very brief period of time.

Tobacco cultivation became the dominant land use activity towards the end of the Company Period. Those planters who first shipped tobacco to England found themselves in the lucrative position of being the primary supplier to an increasing number of addicted European users. The situation fueled a boom in Virginia tobacco as more colonists rushed to cash in. At first, planters cultivated abandoned Native fields and other clearings around their settlements. Burgeoning

demand for tobacco soon resulted in the establishment of new settlements and the wholesale clearing of forest lands along the Lower James River.

The Rice Center

Three major Company Period sites are known in immediate proximity to the Rice Center. These are Berkley Hundred, Shirley Hundred and Jordan's Journey. Shirley Hundred, the founding of which dates to 1613, appears to have been located on the western end of Eppes Island. cursory excavations by the Archaeological Society of Virginia uncovered evidence of an early 17th century settlement in this location. Berkeley Hundred was situated in the immediate vicinity of Berkley Plantation. The settlement was founded in 1619 by a group of five English investors including George Yeardley and Richard Berkeley (Sutton 1982). The area of the Rice Center appears to have been encompassed by lands associated with Berkeley Hundred. However, the actual location of the settlement has not been identified archaeologically. The Jordan's Journey settlement was located on Jordan's Point, just east of where the Benjamin Harrison Bridge makes landfall on the south side of the James. Also founded in 1619, Jordan's Journey was extensively investigated by Virginia Commonwealth University archaeologists under sponsorship of the Virginia Department of Historic Resources. The site remains one of the most extensively documented fortified English settlement of the period (Mouer et al. 1992). A fourth Company period site known as Flowerdew Hundred has also been excavated in the area (Deetz 1993). Flowerdew Hundred was located on the south bank of the James River, a few miles downstream from Jordan's Journey.

Land use practices in each of the settlements revolved around tobacco. At Jordan's Journey, the pattern of English settlement on a former Native American village site was documented archaeologically (Mouer et al. 1993). The other three settlements were also situated on low river terraces, and it is likely that these prime occupation areas exhibited some evidence of former Native land use at the time the English arrived. The colonists further cleared wide swaths of forests around their settlements to obtain timber for house construction and fortification palings, and to open lands for tobacco cultivation. Perimeter areas were also likely kept clear for security reasons. Threats at the time included not only the Natives, but also the specter of a Spanish naval force sailing up the James intent on thwarting England's colonial venture in the New World. Jordan's Journey fortifications appear to have been constructed in a defensive posture with respect to the river. View shed analysis conducted by this author on an outlying compound located between the river and the main fort, revealed that the smaller fortification was situated precisely to afford maximum line of sight distance along the main channel of the James in both upstream and downstream directions. In all probability, river bank areas around the settlements were cleared of trees to provide open sight lines for defensive purposes.

The Early Colonial Period (1625-1699)

The Lower James River

The later 1620s saw a rapid expansion of the English settlement along the Lower James River. Life for the new settlers was harsh and death rates remained appallingly high. However, colonists who survived their first few years and were able to obtain land stood to profit handsomely from the tobacco boom. Even though lands along the James were cleared for cultivation at a rapid rate, tobacco production could not keep up with demand. Furthermore,

importers in London were able to corner the European market, keeping prices high. The rush to profit from tobacco created a huge demand for both land and labor in the Virginia colony. Much of this labor was provided by indentured servants and steadily growing numbers of enslaved Africans. The tobacco boom ended with a precipitous decline in prices during the 1660s (Deetz 1993).

Following a brief retrenchment brought on by the price collapse, tobacco cultivation once again expanded as market conditions matured and demand continued to rise. While Virginia had long become self-sufficient in food production, the colony's economy continued to revolve around tobacco. As the century wore on, distinct trends in settlement are discernible. The inevitable soil exhaustion brought on by tobacco monoculture resulted in abandonment of lands cleared during the boom years. Also ongoing was a distinctive trend in the concentration of wealth. During the latter 17th century, individual planters who had been able to secure prime tracts of land and work them with indentured and/or slave labor prospered and accumulated additional land and other resources.

In analyzing data archaeological data obtained from broad ranging excavations at Flowerdew Hundred in the context of recognized historical trends, Deetz (1987) summarizes the 17th century settlement history of the area:

Early in the tobacco boom, lands along the river were extensively cleared and uniformly cultivated. As prices declined and tobacco was no longer a source of instant wealth, some of these lands were abandoned. With increasingly available slave labor and a stabilizing tobacco market, cultivation again expanded. Finally, settlement of the Flowerdew Hundred area decreased and home sites were abandoned as plantation lands fell into ownership of a few persons and finally, a single individual.

As detailed in the succeeding subsection, this consolidation of land would come to characterize the Lower James River-front through the subsequent years, culminating in grand plantation holdings of the 18th century.

The Rice Center

Land comprising Rice Center property fell within the 1619 Berkley Hundred settlement. The exact site of this original early 17th century occupation has not been documented archaeologically. However, based on observed patterns at nearby locations, the most likely location was the terraces fronting the river in vicinity of the original 18th century manor house. The Western Terrace of the Rice Center probably remained untouched during the establishment of Berkeley Hundred. This situation likely changed during the early decades of the tobacco boom when the Rice Center area was almost certainly cleared for cultivation. While typically not chosen for the earliest settlement, high terrace settings such as that of the Rice Center undoubtedly found favor during the succeeding decades as lower lying areas had been claimed and cultivated. The high terrace settings also offered several advantages, among these were the adjacent steep slopes which aided in defense. Another factor was the practical availability of drinking water. Swales along the terrace edges leading adjacent to stream down cuts presented opportunity to dig wells to capture near surface groundwater. Such early well features often consisted of barrels stacked in a shallow excavation which were filled in. There are several locations within the present Rice Center property at which these steep drop offs together with

possible suitable well locations occur. These areas have the greatest probability for having mid 17th century archaeological sites. Perhaps the most likely 17th century occupant of the Rice Center would have been indentured servants who lived out the service time and were awarded land of their own to clear for cultivation. Many such homestead sites were highly ephemeral in nature and were occupied for only a short period of time.

In 1691 the Rice Center property was sold to Benjamin Harrison II. The Harrisons would rise to be one of the most prominent families in Virginia history. Benjamin Harrison V would become Governor of Virginia, a Revolutionary leader and signatory of the Declaration of Independence.

The Colonial Golden Age (1700 – 1775)

The Lower James River

In the early 18th century, prime James River front lands in the area had been consolidated into large private holdings that formed the underpinning of Virginia's Tidewater plantation system. By 1691, the lands formerly comprising the patch work of properties stemming from the establishment of Berkley Hundred had all come under the ownership of Benjamin Harrison II (Keith et al. 1985). His decedent, Benjamin Harrison IV built Berkley Plantation manor in 1726. The Rice Center tract remained in the Harrison family until 1791, when it was sold to the family of John Tyler (Keith et al. 1985). John Tyler would later be president of the United States. In addition, William Henry Harrison, son of Benjamin Harrison V and the ninth president was born at Berkeley.

Upstream from the Rice Center, wealth generated by the amalgamation of prime agricultural lands by the Hill family allowed for the construction of Shirley Plantation Manor beginning in 1723. The consolidation of property also occurred on the south bank of the river. On Jordan's Point, the lands that supported the original early 17th century settlement passed into the hands of the Richard Bland, who constructed a large manor house on the site (Mouer and McLearean 1993).

The consolidation of properties along the Lower James River shores by wealthy elite ushered in significant changes in land use. These changes can be seen as a positive step towards what would today be referred to as "sustainability" and proper environmental stewardship. The economy of 18th Virginia was fundamentally agrarian. Europe provided a lucrative market for Virginia tobacco and remained the primary source of manufactured goods and luxury items. In this system where the root source of wealth and power was the land, the James River plantations would have been run as carefully managed enterprises.

In addition to tobacco cultivation, plantations lands were managed for cereal crops, fruit, animal fodder, grazing, and timber. Woodlots were typically retained in proximity to major plantation properties to provide a ready supply of fuel and lumber. Woodlots also provided mast and other forage for domestic and semi-feral hogs. The 18th century planters were well aware of tobacco's soil depleting characteristics. Some crop rotation and fallow field practices would have to have been undertaken to keep production at economically viable levels. From an environmental perspective, the managed land use practices of the major 18th century plantations represented a significant improvement over the unfettered tobacco monoculture characteristic of the boom years the century before.

The Rice Center

The Rice Center property remained in ownership of the Harrisons family for most of the 18th century. Land use is uncertain for this time. During the previous century most of the potentially arable land around Berkeley Hundred had been opened for tobacco cultivation, presumably including the Rice Center. Soils along the Western Terrace are clayey and dense. It is unclear how agriculturally productive these soils were during historic times. In all likelihood, however, these soils would have been difficult to plow and otherwise manage for agricultural production. Pasture or grazing land is likely to have been the most prevalent use. Areas east of Kimages Creek are likely to have been allowed to revert to forest sometime following the tobacco boom of the 17th century. Civil War era cartographic sources (Gilmer 1863) show the area east of Kimages Creek as wooded, and these areas remain so today. It is unclear at what point in time these lands were allowed to revert to forest but this could have occurred as early as the later decades of the 17th century. This area east of Kimages Creek would then likely have functioned as a wood lot for the adjoining Berkeley plantation property. As such, timber would have been selectively harvested on an as needed basis.

By contrast, large tracts of surrounding James River terraces, such as those around Berkeley and Shirley plantations are presently in cultivation. It is assumed that most prime farm land along the James River shores has remained open since its original clearing sometime during the early to mid 17th century. Further, select areas such as the Jordan's Point peninsula had been open since late prehistoric times. Factors such as soil fertility, texture, and the appropriate moisture retention and/or drainage characteristics set these tracts apart from lesser agricultural land, allowing them to remain viable. By contrast, other areas such as the Eastern Terrace of the Rice Center were probably allowed to revert to woodland following the initial tobacco boom years. The agricultural status of the Western Terrace during colonial times is uncertain. The Gilmer (1863) map shows this area as open and later sources suggest it remained so until well into the 20th century. It is possible, likely perhaps, that the Western Terrace was cleared sometime in the early to mid-17th century and remained in agricultural use to some degree. The primary soil class on the Western Terrace is not identified as prime farmland (USDA 2006). Again, given the relatively fine texture and only moderately well drained character of these soils, pasture and hay production would be its most appropriate use over time.

The Kimages Creek bottom is likely to have remained wooded up until the Civil War. However, bottomlands in the area typically support several species of trees, the wood of which was highly sought for specific uses. Principally among these is bald cypress. Wood of the bald cypress is highly resistant to rot (Taber 1995) and was therefore favored for the construction of piers and docks which studded the James River shores throughout historic times. Yellow poplar also thrives on stream bottoms and low lying coves bordering the Lower James River. The strong, light, and malleable wood of the yellow poplar was principally sought for cooperage and the manufacture of crates, boxes, and tobacco hogheads, as well as for specialty furniture and boat building uses (Taber 1995). These two tree species were likely selectively harvested from along Kimages Creek and other nearby stream bottoms during much of the historic period.

Given its location as a boundary area between two major plantations, residences are likely to have been present on the Rice Center tract during colonial times (other than perhaps short term homesteads during the mid to late 17th century). The Gilmer map (1863) indicates a James River

wharf located just downstream of Kimages Creek. This same area has yielded historic artifacts dating to as early as the turn of the 18th century (MacCord 1963). The Harrison family is known to have operated a passenger landing on the property and it is likely that this wharf was extant relatively early in the colonial era. As a suitable boat landing, the area may have been a focal point of activity beginning in the tobacco boom years of the mid 17th century. However, it is unknown if dwellings would have been present around the river landing.

The American Revolution and Federal Period (1776-1819)

The Lower James River/Rice Center

The American Revolution resulted in very little changes in terms of settlement and land use along the Lower James River. The Rice Center lands remained under the same owners and land stewardship practices of the property remained essentially unchanged. Kimages Landing likely remained in operation during these years. A change of ownership occurred in 1791 when the property was purchased by the family of John Tyler who would become the tenth president of the United States (1841-1845).

The Antebellum (1820 -1860)

The Lower James River

During the first half of the 19th century, farmers along the Lower James found a ready and growing market selling food stuffs to Richmond's and Petersburg's burgeoning population. As Richmond grew, inland forests on the Virginia Peninsula helped supply the lumber needed to support the growing urban centers along the Falls. Brick clamps operated in various locations, producing the vast quantities of building material needed in the construction of both factories and homes upstream. Antebellum Richmond had some of the largest milling operations in the country and the export of wheat flour and corn meal worldwide provided farmers in the area additional markets for their harvest. While virtually all of the Lower James River area remained rural, the ongoing development of the new urban areas, along with growing markets for cereal crops, was sure to have taxed local resources, notably arable land and forest areas. Timber in particular was in high demand as wood comprised a primary building material, and the main fuel source for home heating and cooking uses. Large amounts of wood charcoal was also required to run the iron furnaces and blacksmith forges of the time. In addition to food production, large amounts of land was set aside for grazing or feed crop cultivation. Horse, oxen and mules were the primary form of traction and required large quantities of feed, adding to the pressure for available farmland. Early photographs from the mid-19th century along the James River often show wide areas of virtually denuded of trees with pasture taking up large areas. Figure 6-1 provides a mid-19th century view of the James River shores looking downstream from Drury's Bluff. In the photo, large areas of river facing land are open and in pasture, with only scatters of individual trees present.



Source: Library of Virginia Collection

Figure 6-1 Civil War Era View of James River from Drewry's Bluff

The photo shows a Civil War era view of the James River from Drewry's Bluff. Both sides of the river appear to be in pasture. Note that trees occur only intermittently. Much of the opposite shoreline areas are free of tall vegetation suggesting these areas were at least partially subjected to browsing by livestock.

The Rice Center

During the Antebellum years, the Western Terrace of the Rice Center was open, as shown in the 1863 J.F. Gilmer Confederate Engineering Bureau Map (Figure 6-2). The clayey and apparently deflated condition of the modern day soils would better support pasture and grazing rather than field crop cultivation and it is hereby postulated that the Western Terrace was utilized as such. It is also probable that these areas had remained open since the original 17th century land clearing. By contrast, the Gilmer map shows the terrace east of Kimages Creek as wooded. These areas may have been allowed to forest as early as the end of the tobacco boom years, some 150 years prior. Although not in actual agricultural production, wooded areas such as these served an important function in the agrarian economies of the time. In addition to yielding lumber and fuel, wood lots along the Lower James provided mast and other forage for hogs. In the absence of refrigeration, ham and bacon were the primary preserved meats in Virginia diets. Hogs were typically allowed to fatten on mast and crop waste during the autumn, then slaughtered and the meat smoke cured during the cold weather months.

In summary, mid-19th century land use areas of the Rice Center property were divided by Kimages Creek. The Western Terrace upriver of Kimages Creek was open. Pasture and hay production is thought to have been the most common agricultural use. The Eastern Terrace was wooded during this time. It is assumed that these conditions represent the continuation of a pattern that had been in place since the mid-18th century and perhaps much earlier, dating back to the end of the tobacco boom.

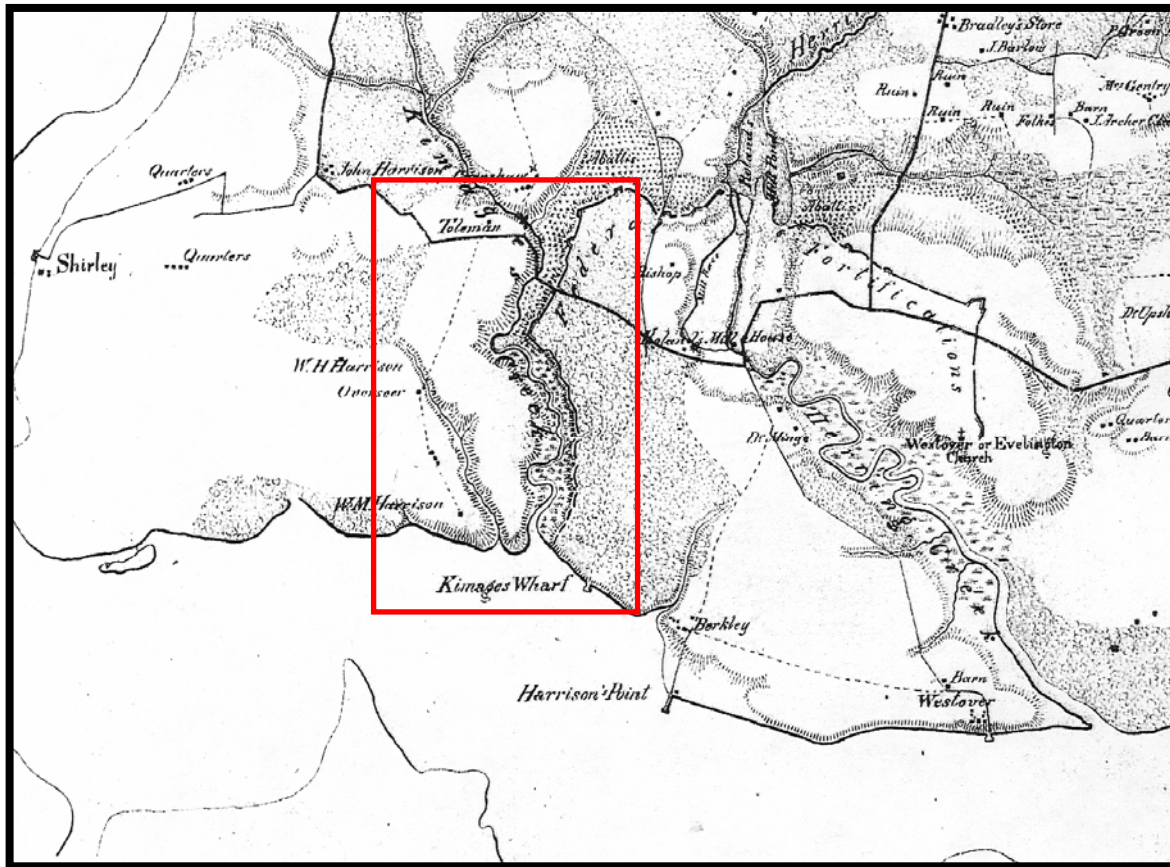
Civil War and Reconstruction (1861-1880)

The Lower James River

The immediate area of the Rice Center swelled in population a thousand fold in July 1862 when General McClellan moved the Army of the Potomac to Harrison Landing at Berkley Plantation. The 100,000 man strong Union force spent six weeks encamped in fortified positions just east of the Rice Center. The western end of these earthworks cut across the Rice Center property just east of Kimages Creek. Following the bulk of the forces' departure, Harrison Landing remained in Federal hands for the remainder of the conflict.

Although the Lower James shores suffered relatively little actual wartime destruction, these rural areas were perhaps slower to recover from the war than Richmond. An immediate post war effect felt all over the South was the lingering labor shortage resulting from wartime displacement and mortality, and the emancipation of the enslaved population. Other factors leaving a mark on the economies and cultural landscape of the Lower James included the breakup of large landholdings and the establishment of new rural communities by freed slaves.

The localized but extensive environmental disturbance wrought by the Civil War is well recognized. During the winter the primitive roads of the time became all but impassible, leaving the armies immobilized. Throughout the war, forces of both sides spent the winter months



Source Gilmer 1863

Figure 6-2 Approximate Enclosure of the Rice Center Study Area on the 1863 J. F. Gilmer Confederate Engineering Bureau Military Map

Figure 6-2 shows a portion of the 1863 Confederate Engineering Bureau *Map of Map of New Kent, Charles City, James City, and York Counties* drawn to support the defense of Richmond. The red box roughly encloses the contemporary Rice Center property. The west end of the Rice Center is defined by the unnamed drainage that meets the James just west of Kinages Creek (Lake Charles). The two drainages define a triangular terrace. This terrace is shown as being open from the James River bluff north to the roadway that roughly follows the contemporary Route 5 alignment. Areas east of Kinages Creek are shown as wooded. Route 5 is shown along its approximate present day course and demarcates the northern limits of the property. Union earthworks (Federal Fortifications) constructed at the end of the Peninsular Campaign are shown enclosing the Berkley area. Stippling on the map suggests that large areas outside of the fortification had been cleared (to provide open fields of fire). The headwater reaches of the unnamed drainage is shown wooded.

encamped in the field, often living in primitive shelters consisting of earthen dugouts covered by a superstructure of wood or canvas. The eroded remnants of these winter quarters remain visible in numerous locations across the Virginia landscape. The construction of hundreds or even thousands of semi-subterranean shelters and other camp infrastructure, together with the deforestation of surrounding woodlands for building material and fuel to sustain an entire army, left some locations so disturbed that the land became nearly worthless. The level of disturbance, wrought by tens of thousands of men was such that to mitigate or repair the damage was not possible for many individual property owners, particularly during the economically depressed, labor-strapped years following the war.

At least one researcher documenting Civil War winter camps has observed a correlation between these sites' location and present day rural settlement by African-Americans (Joseph: personal communication 2006). Emancipated slaves and displaced Blacks often sought the protection of the Union encampments and later squatted on the abandoned land taking advantage of wells and perhaps temporary housing structures left behind after the troops moved out. Joseph notes that some of these squatter camps appear to have developed into established Black communities that remain today, demonstrating a direct link between Civil War winter camp locations and contemporary rural settlement patterns. In the area of the Rice Center, freed Black communities appear to have been established along the headwaters of the interior drainages. The location of both freed and slave Black communities as a component of the overall James River settlement pattern is further discussed at the end of this section under Antebellum Cultural Geography of the James River in the Vicinity of the Rice Center.

The Rice Center

Much of the Rice Center was open and in agricultural use at the time of the Civil War. The Confederate States of America Engineering Bureau maps of Charles City County produced under the J.F. Gilmer (1863) shows excellent detail of the Rice Center and surrounding areas (See Figure 6-2). The Gilmer map clearly shows the Western Terrace between Kimages Creek and the unnamed drainage as open field. This open area extends from the very southern tip of the terrace overlooking the river, north to the historic Route 5 right of way, which is shown closely following its present day configuration. The headwater reaches for the unnamed drainage are shown as wooded. These woods form a fan-shaped tract. Areas to the east between Kimages Creek and Berkeley Manor are shown wooded. A dock feature, labeled *Kimages Wharf* is indicated just east of the mouth of Kimages Creek. The wharf is connected to the historic Route 5 by a minor way that runs north-south through the woods.

No structures are clearly shown on the Rice Center proper. A house labeled *Toleman* is indicated along the north side of historic Route 5 near the present day Rice Center entrance road. A house labeled *W.M. Harrison* is shown on the riverfront terrace just west of the unnamed drainage. A minor roadway is shown running north along the drainage. It crosses the drainage and extends across the present day Rice Center property and connects with historic Route 5. A structure marked *W.H. Harrison Overseer* is shown along the roadway just before (west) it crosses the drainage. In addition, a row of three structures is shown equidistant between the

overseer's house and the main house overlooking the river. These structures almost certainly represent slave quarters. Just to the west, a similarly configured row of three structures labeled *Quarters* is shown along the road leading to Shirley Plantation.

Also clearly shown and marked as *Federal Fortifications* on the 1863 Confederate map are the U-shaped series of earthworks abandoned by the Union Army the year before. These extend from the mouth of Kimages Creek north along its eastern bank across historic Route 5, east across Herring Creek, back across historic Route 5 to terminate at Westover Church. Stimpling along the outside edge of the fortification line would indicate that these areas were cleared, which would be consistent with military practice of the time. These cleared areas extend as much as 200 yards beyond the fortification limits. A war correspondence sketch of the Kimage's Creek area was published in Harper's Weekly during the time in which the Union Army remained encamped at Berkley (Waud 1862). This rendering shows the Eastern Terrace of the cut over as well. Land impacts depicted in both these period sources are analyzed in the following Section 7 Environmental Impacts.

Dawn of the Modern Age (1881-1899)

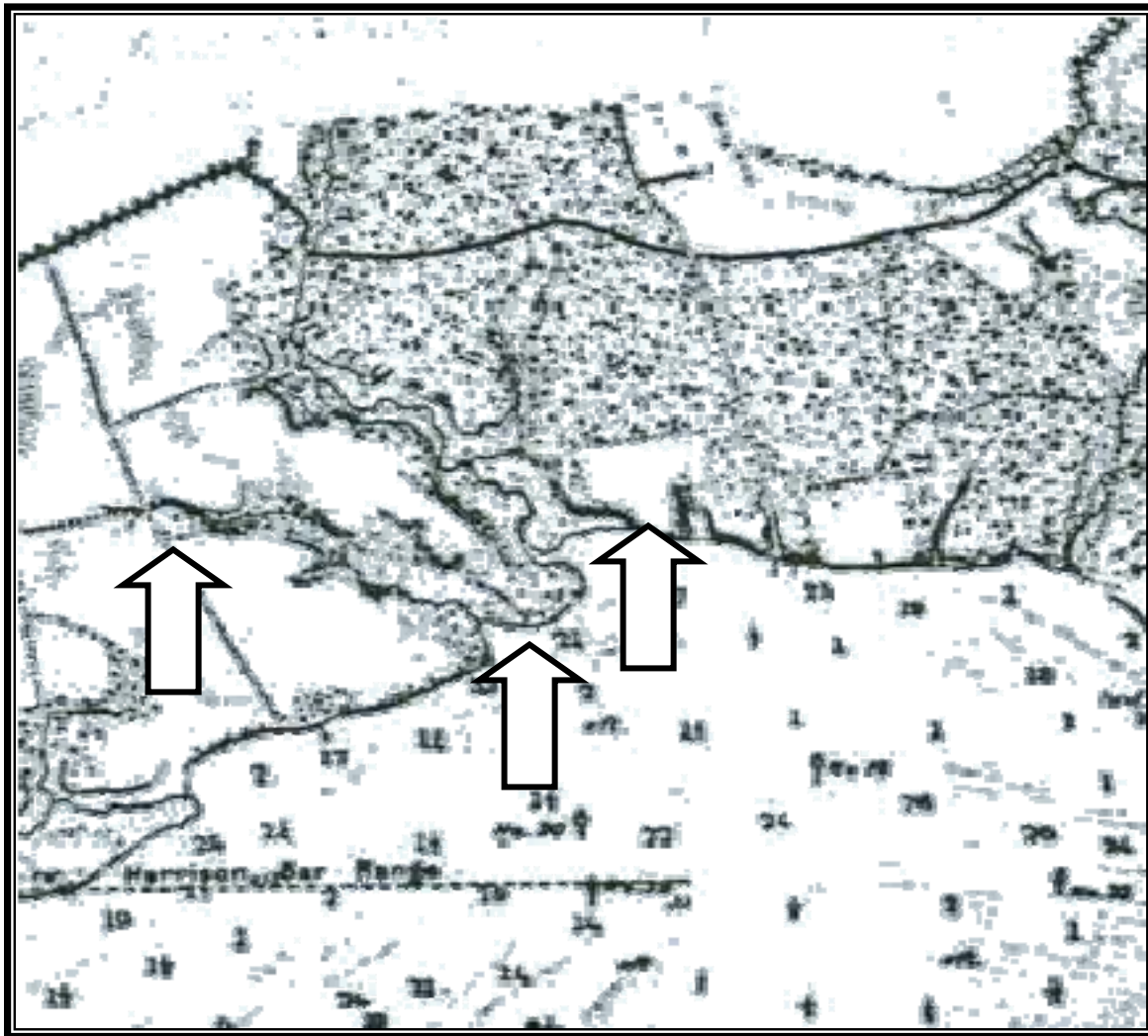
The Lower James

From a settlement and land use perspective, relatively modest changes occurred in the rural portions of the Lower James River during the last two decades of the 19th century, particularly compared to the ongoing growth and rapid industrialization of the Richmond area. However, this growth of Richmond is sure to have placed demands for timber and other resources in the surrounding rural fringes. As discussed in Section 7, this appears to be reflected in land use changes in and around the Rice Center. From a settlement perspective, one obvious change was the development and growth of Free Black communities.

The Rice Center

The 1882 US Treasury Department Coast and Geodetic Survey map *James River Virginia Sandy Point to City Point* (Figure 6-3) provides excellent detail of the study area including some land use rendering that can be directly compared to the 1863 Gilmer map. The 1882 map shows a portion of the Eastern Terrace cleared in a large rectangular plot. A second rectangular clearing is shown in the same area, just outside (east of) the Rice Center limits. West of the Rice Center, the fan shaped woods defining the unnamed drainage headwaters, clearly shown on the 1863 Gilmer map (See Figure 6-2), had been cleared by 1882. The 1882 map shows multiple structures located within these cleared stream headwaters. The post-Civil War clearing and settlement of apparently marginal land very likely represents the establishment of a freed slave community. This community is depicted in subsequent early 20th century maps of the area.

Further to the northwest is high ground labeled on contemporary maps USGS 7.5 minute quad as *Kimages Hill*. The Gilmer map clearly shows the high ground as open. The 1882 map indicated part of this area as having reverted to woodland. On the Rice Center property itself, the portion of the Western Terrace fronting the James River also appears to have fallen out of agricultural use and is shown partially overgrown in the 1882 map of the area. Interior portions for the Western Terrace are shown open.



Source: US Coast and Geodetic Survey 1882

Figure 6-3 1882 United States Coast and Geodetic Survey of the James River from Sandy Point to City Point Showing Area of Rice Center in upper left (northwest quadrant)

*The above map of the James River indicates that areas around the Rice Center forested during the Civil War had been cleared by 1882. The **right arrow** points to land just east of Kimages Creek that had been cleared following the Civil War. This is seen as a result of an increased demand for timber and agricultural products to support a rapidly growing post war-Richmond. In particular, the reconstruction/industrialization of the Virginia capitol likely resulted in burgeoning demand for pasture land, hay and other feed to support the vast number of draft animals, which powered virtually all local, overland transportation of the day. The **center arrow** points to the Rice Center terrace fronting the James River that has partially reverted to forest. The **left arrow** indicates an apparent newly established settlement in the formerly wooded headwaters of the unnamed stream (Also see Figure 6-4). This settlement, located on marginal land, almost certainly represents a freed slave community.*

Early 20th Century (1900-1929)*The Lower James River*

At the end of the 19th century, the majority of Americans still lived in rural areas with their livelihood tied directly to the land. The first two decades of the twentieth century witnessed unprecedented urbanization and the growth of modern industry. During these years, the nation's demographics were transformed through migration as poor, rural folk left the land in search of work in the factories and assembly plants of the growing urban centers. In Charles City County, this trend is reflected in an 8.7 percent drop in population between 1910 and 1920 (Table 6.1). By contrast, Richmond's population increased by an explosive 34.5 percent during the same 10-year period. Mechanization of farming also drove people to leave rural areas during the first decades of the century as the introduction of tractors and other farm equipment reduced the need for agricultural labor. At the same time, poorer farmers who could not afford to mechanize found it even more difficult to compete in the marketplace.

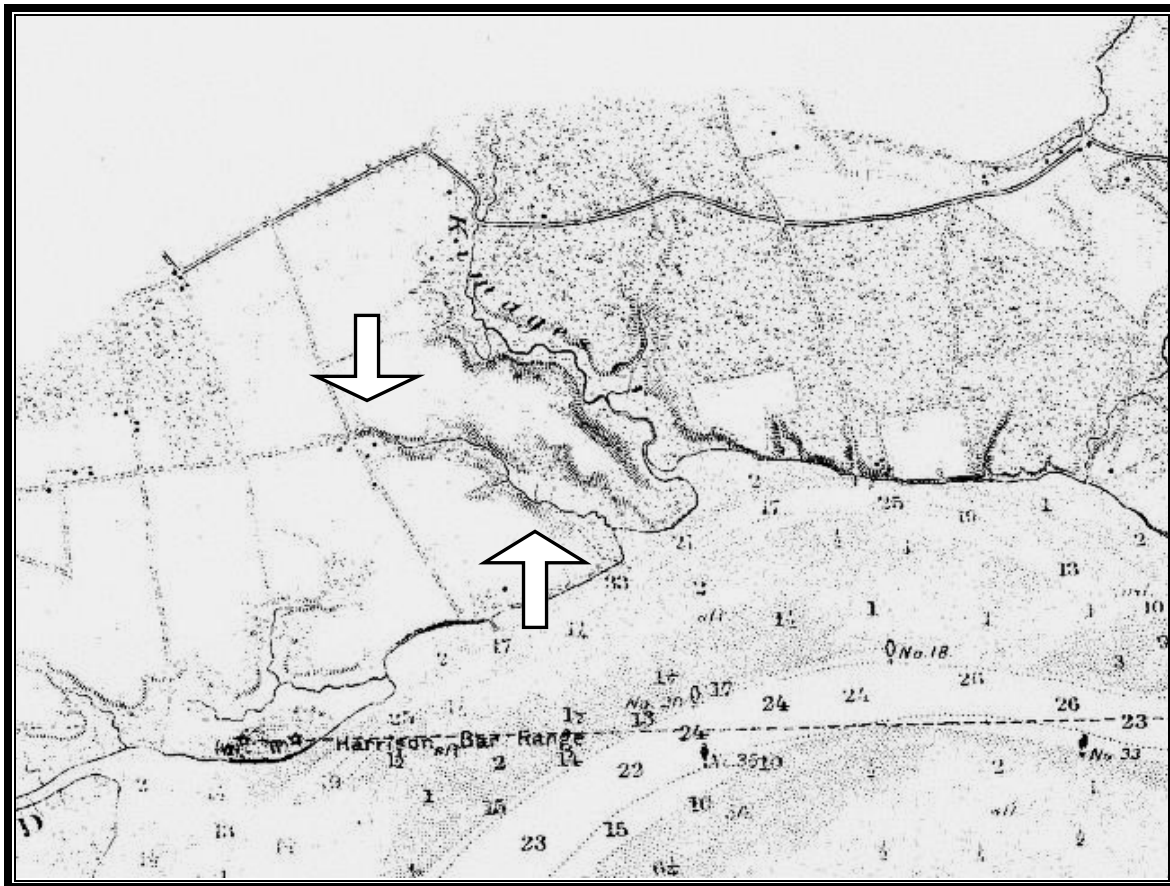
Table 6-1 20th Century Population Trends

Census	Charles City		Richmond		Virginia	
Year	Pop	%Change	Pop.	%Change	Pop.	% Change
1900	5,040	n/a	85,000	n/a	1,854,184	n/a
1910	5,253	4.0	127,628	33.4	2,061,612	10.4
1920	4,793	(8.7)	171,667	34.5	2,309,187	10.7
1930	4,881	1.8	182,929	6.1	2,421,851	4.8
1940	4,275	(14.1)	193,042	6.2	2,677,773	9.6
1950	4,676	8.6	230,310	16.2	3,318,680	19.3
1960	5,492	14.8	219,958	(4.7)	3,966,949	21.4
1970	6,158	10.8	249,621	11.9	4,648,494	14.7
1980	6,692	7.0	219,214	(13.9)	5,346,818	13.1
1990	6,282	(6.1)	203,056	(7.9)	6,187,358	13.6
2000	6,926	9.3	197,790	(2.7)	7,567,465	18.2

Source: US Census Bureau

The Rice Center

The 1907 US Coast and Geodetic Survey Map of the James River (Figure 6-4) shows little change in land use on the Rice Center. The portion of the Western Terrace fronting the James River is shown reverting to woodland. The remainder of the landform remained open and in agricultural use. Also shown as open is the unnamed stream valley, suggesting that the area had recently been timbered. As noted earlier, the likely freed Black community is depicted along the headwater of the stream. The roughly rectangular field on the river fronting portion of the Eastern Terrace also remains. Change would come during the second decade of the 20th century when the property was developed as the Berkley Hunt Club. A dam was constructed at the mouth of Kimages Creek, forming the Lake Charles impoundment. The Kimages Creek bottom was timbered prior to filling of the impoundment. This marked the second time in approximately 60 years that the stream bottom land has been cleared; the first being during the construction of the fortified Union encampment at Harrison's Landing early in the Civil War.



Source: US Coast and Geodetic Survey 1907

Figure 6-4 1907 Update of US Coast and Geodetic Survey of the James River

Figure 6-4 shows the Rice Center area as depicted on the 1907 update of the US Coast and Geodetic Survey of the James River. The map shows fine detail of the Kimages Creek area (center). As in the 1882 rendition, the tip of the western terrace appears to be wooded. Intermittent markings on the terrace landform may be suggestive of trees beginning to grow in that area. Interestingly, the unnamed stream bottom along the western edge of the Rice Center property appears to be cleared (**up arrow**). The two fields opened up after the Civil War along the eastern end of the Rice Center remain extant. Kimages Wharf, located on the eastern edge of the property is also depicted on the map.

The Harrison overseers house and slave quarters shown on the 1863 Gilmer map do not appear. A cluster of five structures is shown (**down arrow**) along the very headwater reaches of the unnamed stream marking the western edge of the Rice Center. This headwaters area was forested until sometime after the Civil War. The cluster of structures shown on the 1907 map (also see Figure 6-3) may likely represent a freed slave community. The tight clustering of the structures in what was likely marginal land located within the headwater basin of the stream would strengthen the interpretation of the structures representing freed slave residences.

The Great Depression and World War Two (1930-1945)

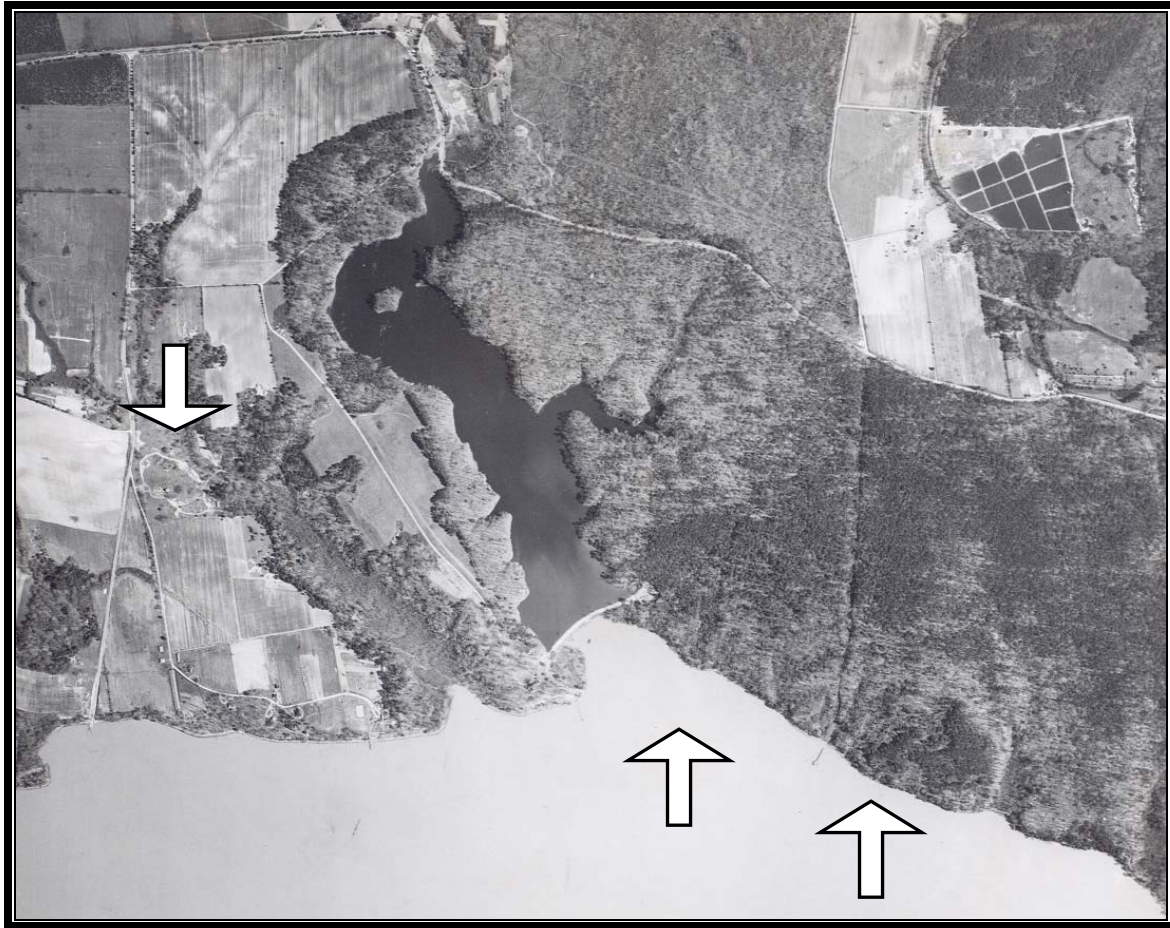
The Lower James River

The Great Depression had a profound impact on the rural landscape of the United States. A major trend of the times was the wholesale abandonment of farmland acreage. Up until the 1930s, significant numbers of modest landowning farmers, tenants, and sharecroppers continued to work small tracts of land. These farmers, many of whom were already poor, faced an even greater disadvantage as the larger, more prosperous farms mechanized. The Great Depression proved to be the final undoing for many of these smaller operations. Typically, these small holdings were of marginal land which had long been subjected to intensive, unwise uses as owners or tenants struggled to eke out a living.

Depictions of poor rural folk fleeing the Dust Bowl are iconic images of the Great Depression and the human suffering it brought. However, the abandonment of farmland and out migration from environmentally degraded rural areas occurred not only in the Southern Plains but across much of the country, including the Virginia Peninsula. Locally, this is evidenced by a 14.1 percent drop in the population of Charles City County between 1930 and 1940 (See Table 6-1). Most abandoned farmland in the area was allowed to revert to forest. On the other hand, prime farmland along the Lower James upstream of the Rice Center continued to be cultivated. Major agricultural operations in this area included Curles Neck Farm, Tree Hill Farm, and several other large holdings fronting the river in the Varina area.

The Rice Center

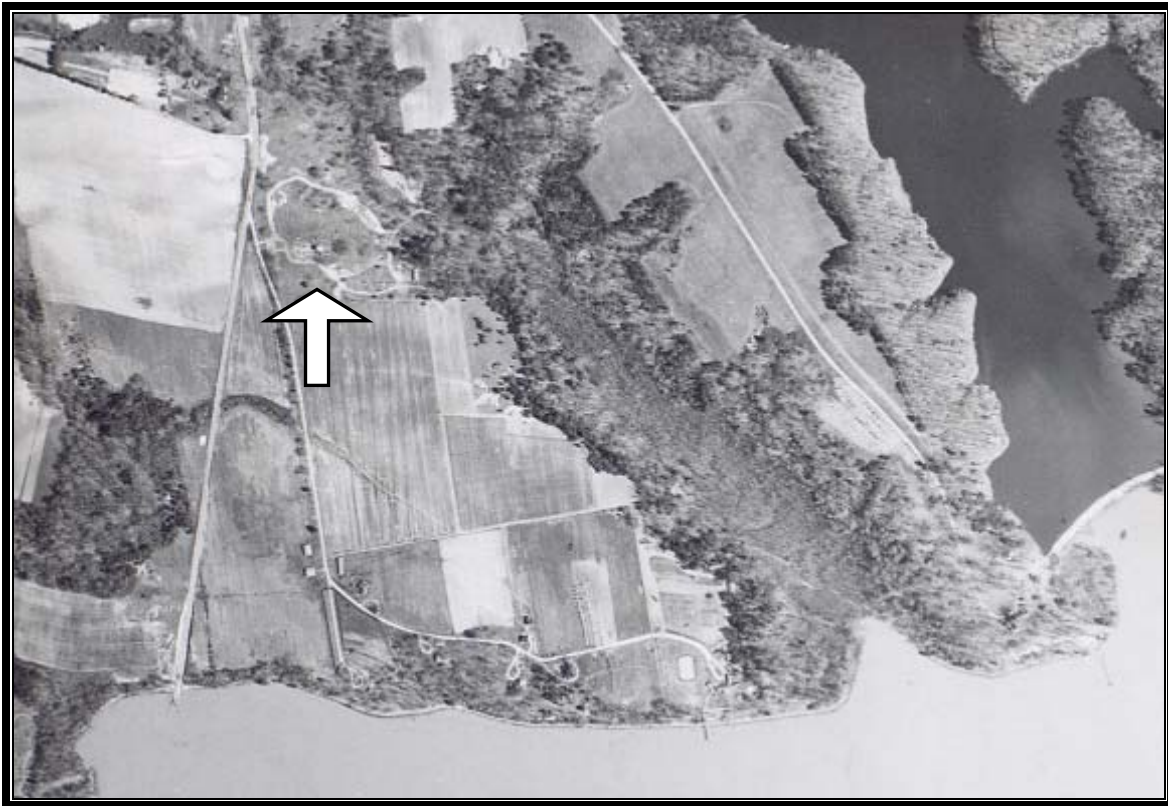
The Depression had a direct impact on land use of the Rice Center. The Berkley Hunt Club failed as a result of the economic troubles and the property was subsequently acquired by the family of Supreme Court Justice Lewis Powell. It was eventually transferred to the Richmond YMCA to be developed into a youth camp. Little appears to have been done with the property until sometime after World War Two. During the Depression, much of Virginia was air photographed as part of a Federal works program. A 1937 air photo of the Rice Center produced under this program provides an extraordinary high resolution view of the property (Figure 6-5). In the photo, the Western Terrace in from the river is shown as open and in agricultural use (as per the 1907 USCGS map; See Figure 6-4). Other fields in the vicinity are plowed or lie fallow. The two fields on the Eastern Terrace, clearly indicated on the 1882 and 1907 maps, had been allowed to revert to forest by this time. Judging from the tree growth, this likely occurred early in the 20th century. In addition to having very high resolution, the photo was flown during the winter, allowing one to differentiate between evergreen and deciduous forest areas. The lower (river-fronting) portion of the Western Terrace appears vegetated in a mix of pine and scrub. Pine heavily dominates on the lower half of the Eastern Terrace. North of the unnamed Kimages Creek tributary, the vegetation transitions to a near 100 percent deciduous forest. However, some pine occurs along the field margins. The unnamed stream bottom making the western Rice Center limits is not forested but rather appears to be covered in scrub shrub vegetation. Clearly visible between the vegetation is the meandering stream channel.



Source: USDA Resource Conservation Service Quinton Service Center

Figure 6-5 1937 Air Photo of James River Showing Rice Center Area

*This 1937 air photo of the VCU Rice Center area allows one to chart settlement and land use changes by comparing to the 1882 and 1907 UCGS surveys of the James River (Figure 6-3 and Figure 6-4). The VCU Rice Center lands surround the Kimages Creek impoundment (Lake Charles) with Route 5 the northern limits. The **left down arrow** points to the remains of the probable freed slave settlement first seen in the 1882 map. The **right up arrows** point to the areas cleared after the Civil War that had been allowed to revert to forest.*



Source: Gilmer 1863

Figure 6-6 Enlargement of 1937 Air Photo

Figure 6-6 shows an enlargement of the probable historic Black community established along the headwaters of the unnamed drainage that defined the VCU Rice Center western boundary. Two structures are visible along with apparent former structure locations. The structure locations are connected by a looped road. These stream headwaters had been wooded during the Civil War (see Figure 6-2). A 1953 air photo (Figure 6-8) shows the area having reverted to forest with no trace of the structure locations or the looped road.

Interestingly, the apparent freed slave-founded community located at the unnamed stream headwaters, shows up on the 1937 air photo. While only two or perhaps three structures are visible on the photo, the footprint of several more are discernible as doughnut shaped areas clear of vegetation (See Figure 6-6). The existing structures and apparent former structure locations are linked by a looped road, indicating an interesting level of community organization.

Modern Era (1946- Present)

The Lower James River

During the second half of the 20th century, the south bank of the Lower James experienced significant suburban/ industrial development. By contrast, areas north of the James remained rural. The population of Charles City County, which had been falling since the first decades of the century, began to grow and by the mid-1950s surpassed its turn of the century high of 5,040. The following decades saw modest increases in population, except for the 1980s, which registered a slight decline. The Year 2000 Census recorded a population of 6,926.

The beginning of the 21st century set the stage for significant changes to the James River below Richmond. During the suburban expansion of the 1960s, 70s and 80s, the Richmond metro area exhibited a curious distortion in its physical growth by which the southern and southwestern suburbs expanded rapidly, while areas east of the city remained rural. Prior, the city had steadily expanded westwards since the build out of the Fan and nearby residential districts during the first decades of the 20th century. Much of this early 20th century growth was facilitated by the newly developed electric streetcar system. At the same time, Richmond's industrial core migrated southward along the Atlantic Coast Line and Seaboard Air Line (now CSX) railroad lines and later, Interstate 95. By the 1960s, the automobile and a growing road network pushed suburban development to the southwest, well away from downtown and the industrial corridor extending from the south bank of the James south along Interstate-95.

Race has long played a formative and divisive role in Richmond life and the city has historically been segmented along racial lines. Racial factors also clearly helped shape the modern configuration of the greater Richmond metro area. Some of the southwestward expansion of Richmond's residential fringe during the last quarter of the 20th century can be attributed to middle class families moving out of the city in what was contemporarily referred to as "white flight". As shown in Table 6-1 this phenomenon, common across much of the United States, is reflected in a steady decline in the city's population beginning in 1970. The 1990s saw a continuing growth of Richmond's suburbs to the west, the southwest, and increasingly to the north along the Interstate-95 corridor towards Ashland. By contrast, development was essentially non-existent on the east side of the city, north of the James River. As a result, one could drive east along Route 5 out of Richmond and immediately transition to rural Henrico County, just beyond the ex-C&O Railway Fulton Yard. Travelers driving into the city on Route 5 were greeted with the incongruous sight of Richmond's modern office towers seemingly rising from the corn and wheat fields of Tree Hill Farm.

However, significant changes are now in store for the James River below Richmond. As the 20th century drew to a close, the cultural landscape of Lower James River in the vicinity of the Rice Center remained characterized by rural roadways, individual home sites, farmland, woodlots, and small cross roads communities, and minor commercial nodes such as gas stations and country

stores. In essence, this pattern of settlement and land use differed little from that of the 19th century. Also characteristic of this enduring cultural landscape were the large, manor-type houses that overlook the James River shores.

In 2006, several events set the stage for major changes to the rural areas east of Richmond. Curles Neck Farm, the land of which had been in continuous agricultural use since the mid-17th century, was bought by investors. Closer to Richmond, Tree Hill Farm was also sold for development. The Tree Hill Farm property, which is bordered to the west by Almond Creek and to the south by the James River had constituted Richmond's eastern agricultural fringe since the city's founding in the late 18th century. As a result, the open fields and high terraces of Tree Hill Farm offer unobstructed views of the downtown James River and the city skyline, making the property especially desirable for development. The year 2006 also saw initiation of the Rocketts Landing project, which will transform the former industrial lands stretching from Great Ship Lock Park to Almond Creek, into a mixed use riverfront community. Together these three projects are sure to be a catalyst for additional development of additional, hitherto rural James River areas below Richmond.

The Rice Center

Following World War Two, the Rice Center property were used as a YMCA summer camp (Figure 6-7). Improvements were made to the property during the following decades and the facility contained cabins, restroom/bath houses, a dining hall, swimming pool, and athletic fields.

At its peak, the facility could accommodate 200 overnight campers. These features are shown in a 1960 update of a 1948 USGS 7.5 minute quadrangle, and in the 1953 and 1969 quadrangles. Several other features are indicated on the USGS map. This includes a James River shipwreck in the cove below the Lake Charles dam and the ruins of a dock at the foot of the bluff just upstream. Interestingly, the wreck is discernible, if just barely, on the 1937 air photo (see Figure 6-5). The ruins of the dock are also discernible on the 1937 photo, as are the remains of Kimages Wharf located just downstream of the Rice Center limits.

A 1953 air photo (the image quality of which is poor) shows that all the open areas depicted in the 1937 photo, had reforested (Figure 6-8). The agricultural field on the Western Terrace appears newly planted in pine. The 1953 air photo also shows trees becoming established in the unnamed stream bottom that forms the contemporary Rice Center's western boundary. A marked difference in forest vegetation is noted along the Eastern Terrace between 1937 and 1953. The 1937 photo shows apparently mature pine dominating this area. This same area is shown as selectively harvested of timber in the 1953 air image. Careful examination of the 1953 image illustrated in Figure 6-8 suggests the mature pines have been removed from the southern half of the Eastern Terrace, leaving smaller trees in place. The highly diffuse edges of the apparently timbered areas clearly point to selective harvesting practices.

The YMCA closed the camp during the mid-1970s and the property was purchased by Ambassador Walter Rice, who added a 100-acre tract on the east side of Kimages Creek. This parcel had recently been clear cut and planted in loblolly pine. In 2000, Ms. Ingrid Rice donated the property to Virginia Commonwealth University for the establishment of the Walter and Inger Rice Center for Environmental Life Sciences.

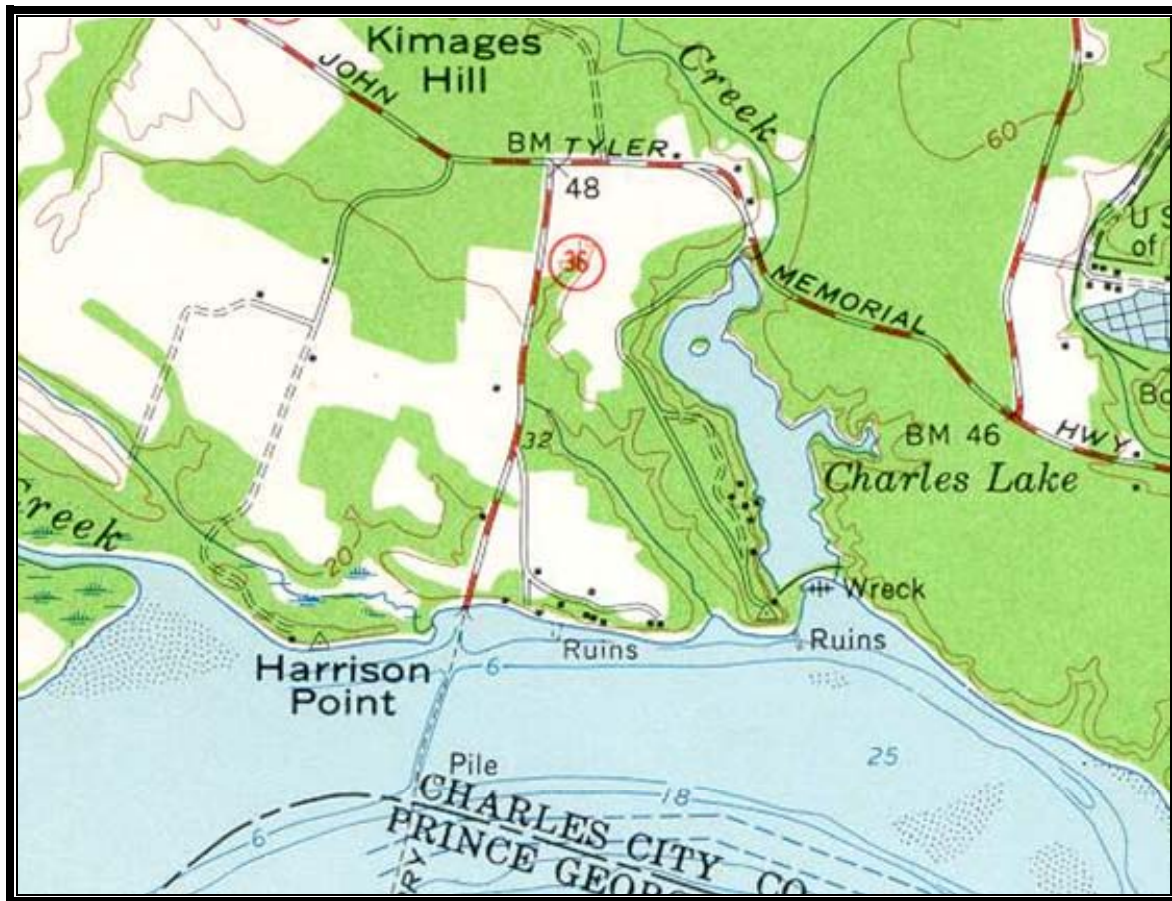


Figure 6-7 1960 USGS 7.5 Minute Series Quad Map Showing Area of the Rice Center.
Note: Map is based on 1948 Air Photo

The above USGS 7.5 minute series Charles City quadrangle is derived from 1948 air photo, partially updated in 1960. Camp Weyanoke is not labeled but a cluster of 6 structures are situated along Lake Charles. Some interesting details are shown. Note the shipwreck symbol below the Lake Charles dam; most likely the remains of an abandoned vessel. The ruins of a dock or quay are shown at the base for the terrace just upstream from the dam. No dock is indicated on any of the earlier historic maps.



Source: Natural Resources Conservation Service

Figure 6-8 1953 Air Photo of Rice Center

Figure 6-8 shows the agricultural field on the Western Terrace planted in pine. Based on the growth seen in the photo it is reasonable to assume that the field was taken out of cultivation and planted in trees sometime in the 1940s. Also telling is that the lower reaches of the Eastern Terrace have been partially timbered (up arrow). In contrast to the clear cutting and intensive planting that occurred in the 1970s, this area appears to have been selectively timbered and allowed to regenerate naturally.

The Cultural Geography of the Antebellum James River near the Rice Center

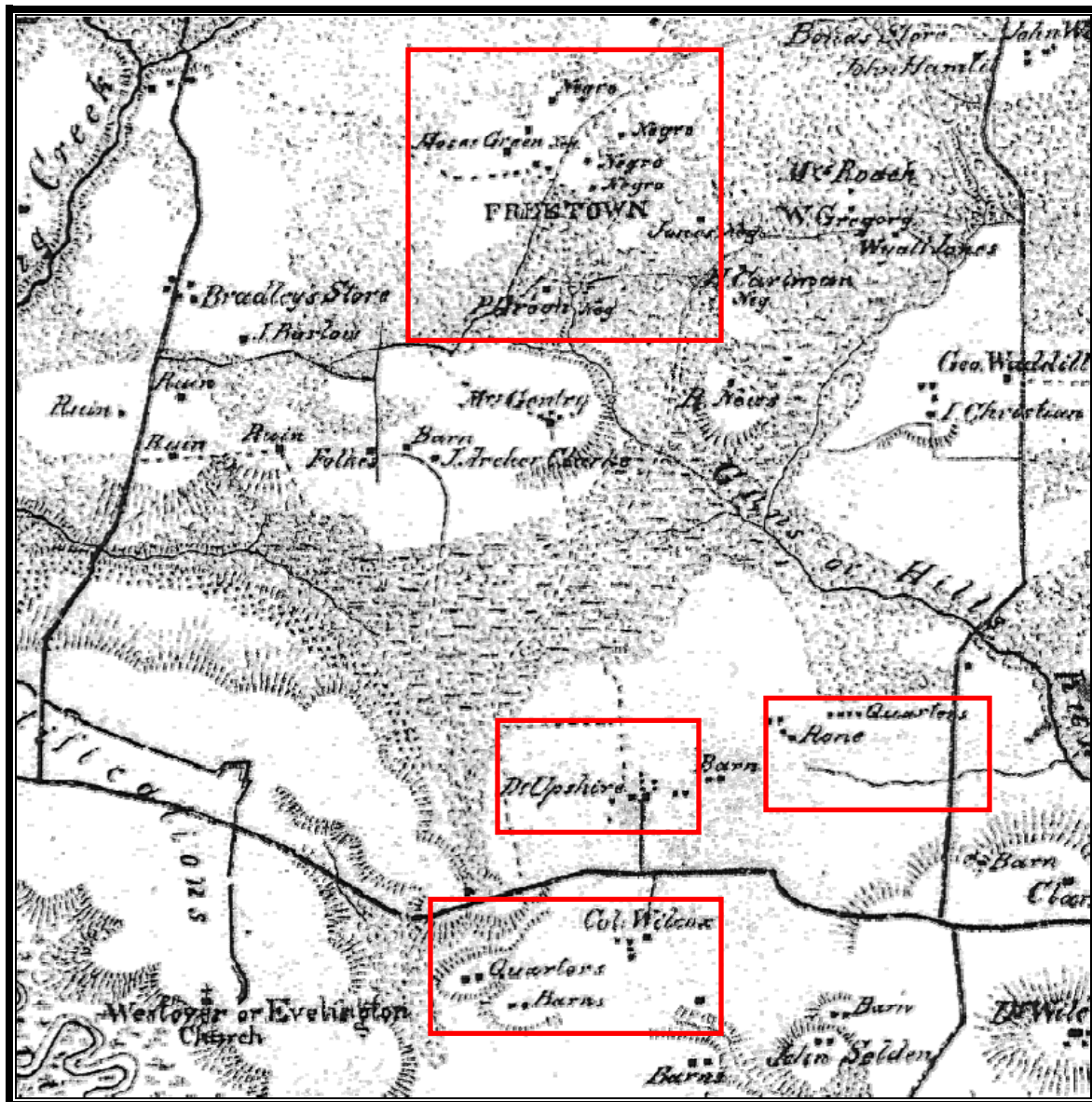
Period cartographic sources dating to as far back as the Civil War were used to help reconstruct human settlement land use along the Lower James River. The Confederate Engineering Bureau (Gilmer 1863) map of the James River below Richmond proved a particularly useful source. The Lower James River leading to Richmond constituted one of the most strategically critical locations during the Civil War. As a result, the Gilmer map contains an astonishing level of detail for a mid-19th century cartographic document, including land use depictions. Further, the refined pre-Reconstruction era view captures land use and settlement patterns that had likely been in place for a century or more, perhaps having endured since the waning years of the 17th century tobacco boom, or at least the full establishment of the Virginia Tidewater Plantation system during the first decades of the 18th century. Not only does the Gilmer map provide land use information specific to the Rice Center property, careful examination of the document offers a clear view of the cultural, social, and economically driven James River settlement patterns of the time. Clearly discernible on the map are slave quarters, and the location of a Free Black community. Examination of the map also reveals the presence of a distinctively hierarchical, socio economically-derived settlement pattern expressed in the spatial relation to the James River shore. This historical cultural geography of the Antebellum James River is the expression of human settlement and land use in the immediate area of the Rice Center and as such, warrants closer review.

Of note is the location of slave quarters in relation to the main residences which reveals an interesting pattern (Figure 6-9, Figure 6-10). In the area of the Rice Center, a row of three probable slave quarters are shown just west of the unnamed drainage that defines the property. These buildings are equidistant from a residence along the James labeled *WM Harrison*, and a second residence labeled *WH Harrison Overseer*. The row of buildings is also situated directly along a road connecting the two main residences. The same pattern is also evident at nearby Shirley Plantation, where rows of buildings labeled *Quarters* are shown along the road leading to the manor house along the river.

The placement of slave quarters in the line of sight of the main house was likely not coincidental. Rather than just allowing the master to keep watch, the intent may have been for the slaves to live in constant sight of the “big house”, with this visual cue meant to reinforce their place in the plantation order. The location of the quarters directly along the road leading to the manor house is perhaps also telling. Instead of shielding their human property from view, the slave residences may have been meant to be seen by visitors arriving by road.



Figure 6-9 shows the location of slave quarters in relation to the main house or an overseers house. The slave quarters on Shirley Plantation are conspicuously located on the road leading to the manor house. The same pattern is observable on the Harrison property bordering the upstream side of the contemporary Rice Center. A cluster of three apparent middling farms located along present day Route 5 downstream from the Rice Center exhibit a different pattern in which the slave quarters are tucked in behind or away from the main house (Figure 6-10 for enlarged view).



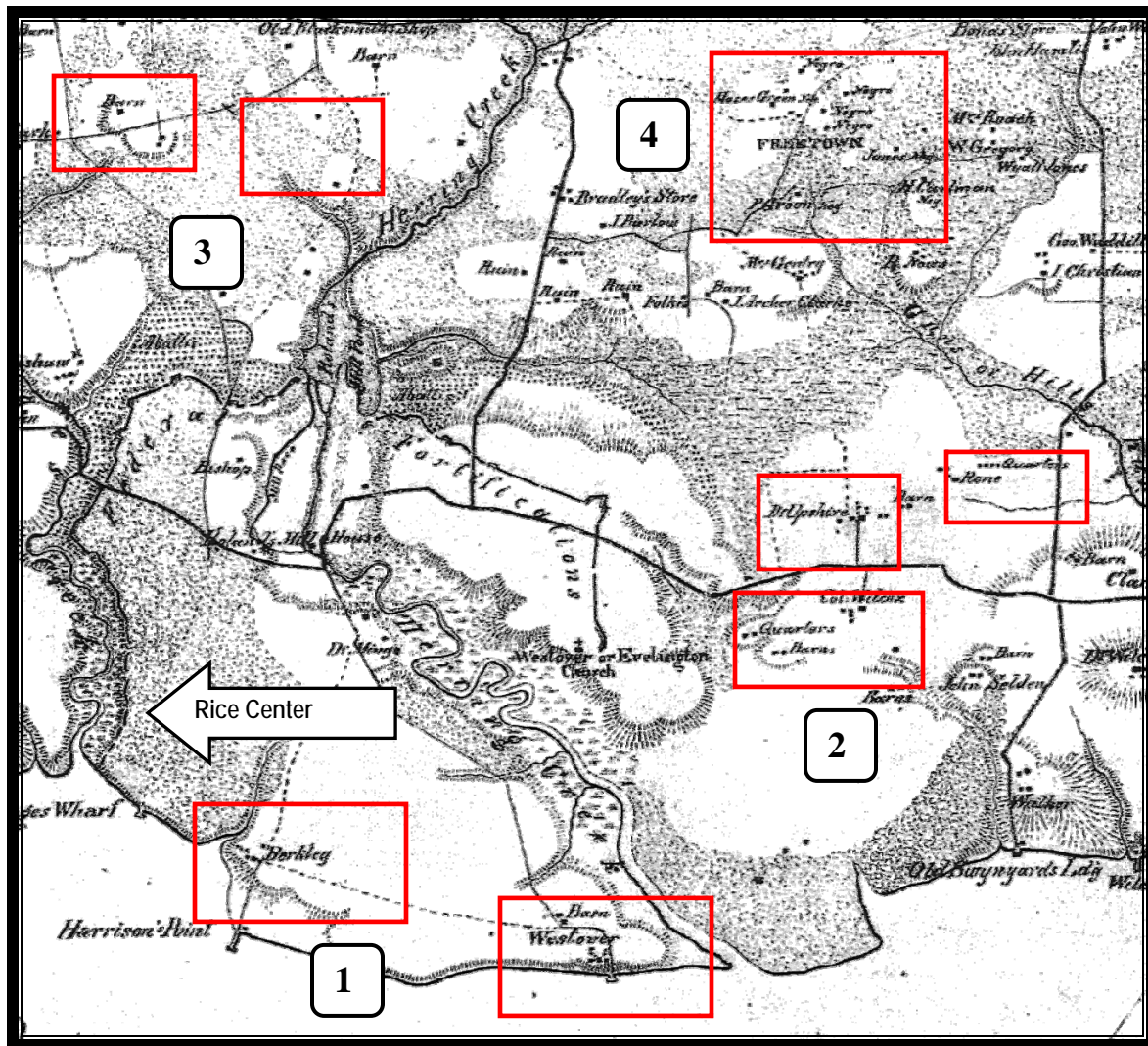
Source: Gilmer 1863

Figure 6-10 Enlargement of Slave Quarters Location and Freetown Location

Figure 6-10 shows an enlargement of the slave quarter locations on the middling properties along present day Route 5. On the Col. Wilcox property, structures labeled *Quarters* are tucked in between the barns and a ravine. On the Upshire farm probable quarters are tucked behind the main house. A free Black community is shown along a marshy area north of the middling properties (top rectangle). The settlement is located along the wooded area indicated marshy headwater reaches of Gunn Run. A number of structures are labeled “Negro” while others have a (illegible name) with “Neg” as a suffix to denote race. Four houses west of the Freetown settlement are labeled “Ruin”.

A somewhat different pattern is expressed on local landholdings inland from river. One such smaller holding labeled *Col. Wilcox* is shown along the south side of the historic Route 5 right of way, just west of where the road crosses the abandoned Union fortifications (See Figure 6-7). Two structures labeled *Quarters* are shown within a wooded alcove, whereby they could not have been viewed by travelers on historic Route 5. The *Dr. Upshire* property is shown on the opposite side of Route 5. A line of three probable slave quarters is shown directly behind the main house, which would have blocked their view from Route 5. However, a third property, the *Hone* house, is shown just northeast of *Dr. Upshire's*. A line of four buildings is labeled *Quarters*. These quarters are aligned parallel to nearby Route 5 and would be clearly visible from the road across the indicated open field. Whether some of the apparent middling landholders deliberately (or subconsciously) sought to minimize the visual presence of their human property is a social historical research question worthy of further study. If such were the case, it could be reflective of certain turpitude among some local middling landowners as to their participation in the institution of slavery. Such turpitude was apparently not shared by the major James River plantation owners, such as those of Shirley who clearly sited their slave quarters in a purposeful manner for all to see.

Also demonstrated on the map is a distinctively hierarchical pattern of settlement along the James River shores (Figure 6-11) whereby the major plantations, middling farmers, small farmers, and freed Blacks each occupy a distinct physical place in relation to the river. The major plantations including Shirley, Berkley and Westover, occupy the prime agricultural land along the James. These elite planters also had direct access to the river. Middling farmers prosperous enough to own slaves occupy the intermediate terraces along historic Route 5. These intermediate size farmsteads on which slave quarters or probable slave quarters are shown include the *Wilcox*, *Upshire*, and *Hone* properties. A far larger number of smaller holdings are shown occupying the interior terraces. These home sites typically have only one or two structures and none have slave quarters indicated. Lowest on the hierarchy is the Black settlement in and around an area labeled *Freetown*. The *Freetown* community is located along what is clearly indicated as the wooded and swampy headwater reaches on Gunns Run, a minor second order James River tributary located two drainages east of Kimages Creek (See Figure 6-8). Numerous *Freetown* structures are labeled *Negro*, while others have a name indicated (illegible) with a *Neg.* suffix identifying race of the occupant. The wooded, swampy setting suggests marginal land. Some open land is shown just west of the *Freetown* settlement. However, four structures in this area are labeled *Ruins*. It is possible that this condition is a result of Civil War activity in the area, either Union naval shelling or purposeful destruction during the establishment of the Union fortifications at Berkeley to deny opposing Confederates shelter/cover. Alternately, the houses could have been stripped down to supply building materials for the Army of the Potomac's encampment constructed one year before the map was produced.



Source: Gilmer 1863

Figure 6-11 Location of Elite Planters, Middling Farmers with Slaves, Small Farmers and a Freed Black Community in the Area of the Rice Center.

The 1863 Confederate military map underscores a distinctively hierarchical settlement pattern along the James River in the vicinity of the Rice Center, the origins of which likely date to the early 18th century. 1) Prime lands along the river are in the hands of the elite planters. These holding include Berkley Plantation and Westover. 2) Middling farmers wealthy enough to own slaves are found on the intermediate terraces along present day Route 5. 3) Small farmers occupy the interior terraces. Typically, these settlements are shown as a single structure. 4) The free Black community of Freetown is located on what is almost certainly the most marginal land along the swampy headwater reaches of a minor drainage.

It is perhaps equally likely that the land was abandoned and the houses dismantled due to degradation of what was already lesser agricultural soils stemming from a century or more of tobacco monoculture and other unwise land use practices. Regardless, the presence of a free Black community in the area conforms to the established pattern of Black settlement on marginal or otherwise unusable land (stream headwater).

Closer to the Rice Center, the Gilmer map clearly shows the headwaters of the unnamed drainage marking the western edge of the property as wooded. As previously discussed, this area was cleared following the Civil War and was almost certainly the location of a freed slave community. This headwater area, which is directly analogous to the *Freetown* setting, was likely marginal land unsuitable for period agriculture and thus available to the lowest status segment of Virginia society.

Comparison of 1860s Rice Center Land Use and Conditions to Contemporary Times

The unprecedented level of detail in the Gilmer map also provides a unique opportunity to directly compare past and present land use patterns in and around the Rice Center. Figure 6-12 shows an enlarged view of the Gilmer map centered on the Rice Center and a contemporary air photo at the same scale. The most striking difference in land use depiction of the mid 19th and early 21st century is the amount of cleared land in the earlier period. This is also often brought out in period photographs, including Civil War era plats illustrated in this study.

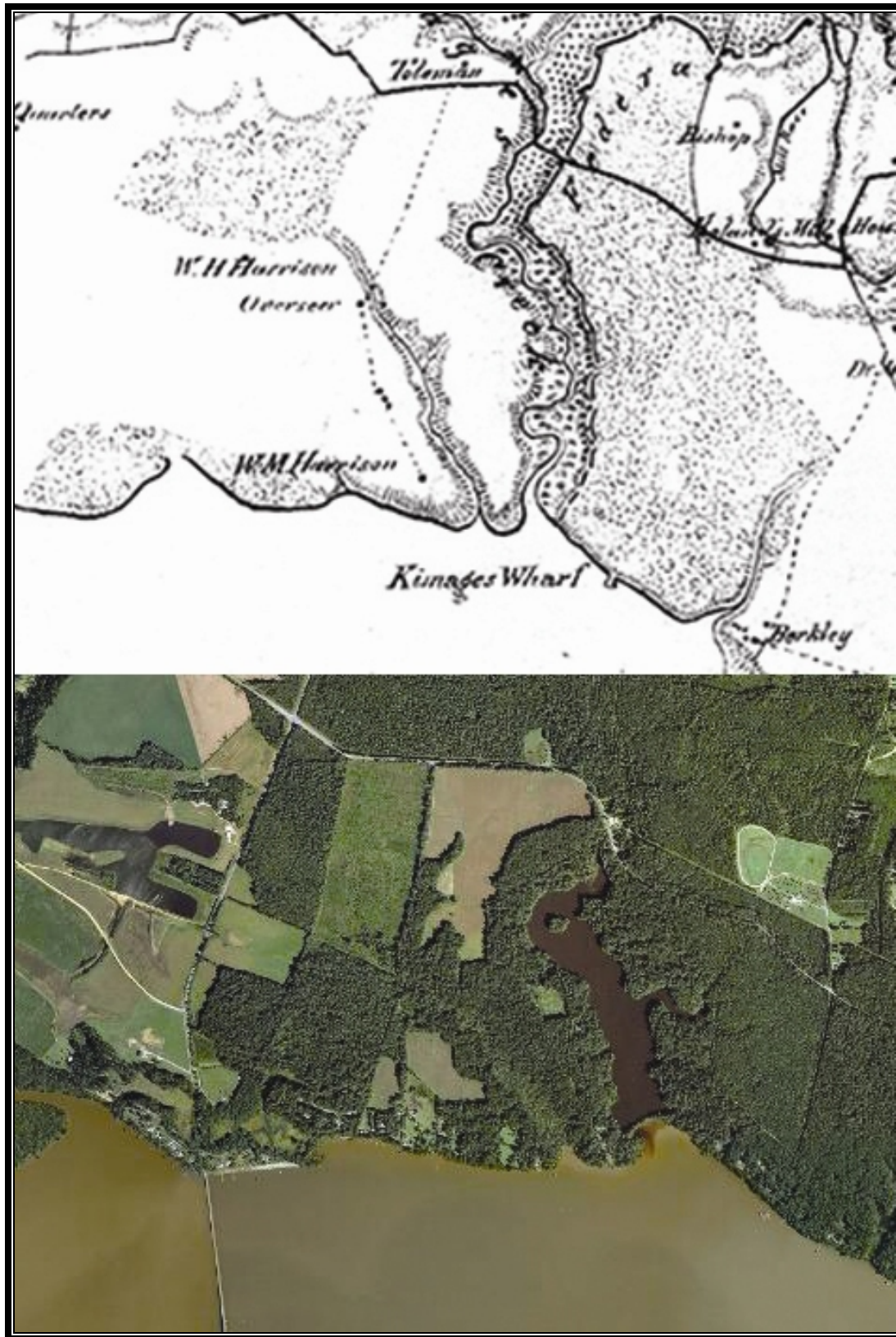


Figure 6-12 1863 Gilmer Map and Contemporary Air Photo of Rice Center

In summary Table 6-2 provides thumbnail account of major settlement episodes and land uses activities that occurred on contemporary Rice Center property from Paleo-indian times through its acquisition by Virginia Commonwealth University.

Table 6-2 Summary of Major Rice Center Settlement and Land Use Episode

Prehistoric	
Time Period	Settlement and Land Use
Paleo-indian 9,500 B.C. – 8000 B.C.	No settlement likely
Early Archaic 8,000 – 6,500 B.C.	Occasional short term encampments by mobile hunter and gatherer groups
Middle Archaic 6,500 – 2,500 B.C.	Occasional short term encampments by mobile hunter and gatherer groups
Late Archaic 2,500 – 1,100 B.C.	Increasing duration and intensity of settlement. Period campsite likely lost to erosion and tidal transgression along James River shores.
Early Woodland 1,100 – 500 B.C.	Settlement is unlikely. Land use likely limited hunting and fishing visits.
Middle Woodland 500 B.C.- A.D. 1000	Increase in settlement in area. Evidence of period encampments both on the upland terraces and along Kimages Creek
Late Woodland A.D. 1000 - 1607	Little or no actual settlement on Rice Center. Land use likely consisted on fishing activities and perhaps communal hunt drives
Contact Period A.D. 1607 – ca. 1624	Continuation of Late Woodland land use practices.
Historic	
Time Period	Settlement and Land Use
Company Period 1607-1624	Initial colonial settlement on nearby Berkley Hundred and Eppes Island
Early Colonial 1625-1699	Settlement use unknown. Probable that short term lower status domestic occupations occurred on property. Uplands cleared for tobacco cultivation
Colonial Golden Age 1700-1775	Property in hands of Harrison family. Land was apparently not settled but rather used for crop/pasture and/or wood lots. Ship landing in operation.
American Revolution Federal 1776-1820	No major changes in land use
Antebellum 1821-1860	Continual agricultural use. Mix of open field and forest. Landing remaining in use
Civil War and Reconstruction 1861-1880	Eastern side of property occupied by Federal forces. Construction of earthen fortification. Extensive clearing as military defensive measure
Dawn of the Modern Age 1881-1899	No new settlement. Abandonment of part of Western Terrace for agricultural use.
Early 20 th Century 1900-1929	Construction of Lake Charles impoundment and establishment of Berkley Hunt Club
Depression/World War Two 1930-1945	Abandonment of remaining agricultural land.
Modern 1946- Present	Development and operation of YMCA camp activities. Timbering of Eastern Terrace followed by pine planting. Development of Rice Center

The environmental consequences stemming from the sum of all land uses spanning all of human settlement along the Lower James River is summarized in the following section Environmental Impacts to the Study Area.

Section 7 Environmental Impacts to the Study Area

Introduction

Initial European settlement in the early 17th century resulted in extensive and lasting impacts to the Lower James River environment. Native Americans, who had lived along the James River shores for thousands of years before, also left their mark on the land. Section 7 provides an analysis of both prehistoric and historic land use impacts to the Rice Center's Lower James River setting.

Impacts

Prehistoric Period

Native American impacts were limited in comparison to those associated with European settlement and land use. Nonetheless, prehistoric peoples' effect on the environment was not inconsequential. The following subsection analyzes impacts to the Lower James River study area stemming from Native American settlement and land use practices.

The Paleo-indian Period (9,500 B.C. – 8000 B.C.) (11,500-10,000 B.P.)

Paleo-indian peoples have traditionally been portrayed as highly proficient hunters of big game, including now extinct Pleistocene megafauna. While there clearly is a hunting emphasis expressed in Paleo-indian site artifact assemblages, many researchers now postulate that Paleo-indians in the Eastern Woodlands somewhat more diverse hunting and foraging subsistence activities not dissimilar to those of the succeeding Early Archaic period. These subsistence practices and other aspects of Paleo-indian life ways are unlikely to have had a significant, direct impact on the local environment. Further, Paleo-indian peoples lived in small nomadic groups that ranged over wide areas. Overall population was low, and the occupation span at any one location limited.

However, while the direct environmental impacts attributable to Paleo-indian activities were likely minimal, the indirect impacts of these peoples' presence may have been substantial. The sudden appearance of Paleo-indian culture across North America was roughly coeval with the final phase of the megafauna extinctions at the end of the last Ice Age. These Pleistocene megafauna and other now extinct mammal species had survived repeated warming cycles over the last two million years, only to succumb at the end of the last glacial episode. Human predation has long been regarded as potentially having played a role in these extinctions. It is possible that the presence of proficient Paleo-indian hunters may have stressed some Pleistocene mammal populations to a "tipping point" at which they could not survive the rapidly changing environmental conditions of the time. The extinctions of large herd animals and megafauna species such as mastodons is certain to have had environmental repercussions. The ongoing effects of these animals' trampling and browsing would have been a significant factor in shaping and maintaining some vegetative communities of the late Pleistocene. The removal of large faunal species from the ecosystem may well have accelerated the reduction of grasslands and the

closing in of the broken forest areas that characterized the late Pleistocene landscape. If Paleo-indian hunters were to indeed have in any way contributed the extinction of Pleistocene megafauna and herd animals, then the indirect ecological impacts of these peoples presence can be considered to have been fairly dramatic.

The Early Archaic (8000 B.C. – 6500 B.C.) (10,000-8,500 B.P.)

The Middle Archaic (6500 B.C. - 2500 B.C.) (8,500 - 4,500 B.P.)

Early Archaic and Middle Archaic peoples along the Lower James River lived as highly mobile hunter and foragers highly adept at exploiting a wide variety of resources. From a land use perspective, the Early Archaic and the Middle Archaic cultural periods are more or less indistinguishable. Consequently, the environmental impacts are best analyzed collectively. These impacts resulting from Early and Middle Archaic period subsistence and settlement practices were minimal, and may have been limited to the trampling and clearing of secondary vegetation around repeatedly visited campsite locations. The use of fire to drive game, if undertaken, would have had more far-reaching effects on the local forest cover and make up. However, period archaeological evidence for fire drives is lacking. No Archaic period sites have been excavated in eastern Virginia that point to large scale, communal hunting activities. Some highly localized opening of the forest may have been undertaken by latter Middle Archaic, possibly evidenced by the appearance of crude, chipped stone axe heads on archaeological sites dating to this time. Other, more compelling evidence for pre-Late Archaic modification of the local environment is lacking for the Mid-Atlantic region.

The Late Archaic Period (2,500 B.C.– 1,100 B.C.) (4,500 - 3,130 B.P.)

The Late Archaic period was a time of pronounced cultural change, including shifts in settlement patterns, changing resource utilization, and the adoption of material culture traits significantly different from those of the preceding five and a half millennia. The Late Archaic also marks the first time in which Native Americans began to deliberately exert significant influence on the local environment. Subsistence practices of the period are often characterized as undergoing a process of “intensification”. This intensification included a focused exploitation of local resources and the production and storage of minor food surpluses. Other cultural trends included increasing degrees of sedentism, population growth, and the development and maintenance of long distance trade networks.

Prior to the Late Archaic, the ecological impact of the Native Americans living along the Lower James River was probably minimal. Subsistence strategies and land use practices adopted during the Late Archaic set the stage for increasing levels of human disruption and modification of local ecosystems; a process which continues to this day. As such, the period in Virginia represents a critical juncture in the relationship between humans and the environment.

Regionally, a significant and growing body of evidence suggests that Late Archaic peoples purposely altered the local environment through the selective use of fire and by other means. Evidence for such actions includes increased levels of charcoal and metals in river sediments, ethnobotanical archaeological findings, and the localized occurrence of aeolian soil deposition on period archaeological sites. Any summary of the Late Archaic archaeological record in the

Middle Atlantic region has frequently included the topic of aeolian soil deposition on sites dating to these times. Wind deposited soils have frequently been documented overlying Late Archaic living surfaces on numerous sites in Delmarva (Curry 1980, 1992; Curry and Ebright 1989; Daniel 1993; Heite and Blume 1995). The same phenomenon has been observed along Lower James River on Curles Neck Farm just upstream from the Rice Center (Virginia Department of Historic Resources Archaeological Site Files). Some researchers, notably Custer (1989) present the occurrence of aeolian soils as evidence of climate-related moisture stress associated with the post-glacial xerothermic. Custer (1989) further maintains that the occurrence the mid-post glacial xerothermic played a significant role in cultural changes of the Late Archaic period.

While the presence of aeolian soils in association with Late Archaic archaeological contexts is not in dispute, most researchers now attribute the site phenomenon as being more closely linked to the changing sedimentary environments and hydrological regime of adjacent river beds, rather than being suggestive of significant climate fluctuations. Additionally, the role that human impacts may have played in triggering highly localized wind-borne soil movement in and around occupation sites must be considered. Highly localized impacts to occupations sites resulting from the clearing of undergrowth and trampling had been occurring since Paleo-indian times. These impacts likely resulted in minor soil erosion, perhaps also triggering aeolian soil movement on a highly localized or micro scale. These occurrences are assumed to have intensified as a result of Late Archaic settlement practices, possibly in conjunction with droughts and short term climatic dryness.

Direct land use impacts associated with Late Archaic cultures were significant, particular when contrasted to those of earlier times. At the beginning of the Late Archaic, the James River flowed through multiple channels flanked by broad floodplains. Portions of this floodplain and perhaps some of the surrounding upland terraces are thought to have been subjected to deliberate burning by Late Archaic peoples. The result would have been a patchwork of open and partially open areas supporting both forest succession plant communities and species that thrive along river and wetland margins. Late Archaic peoples are known to have congregated in base camps, typically located in strategic resource-rich locations. The intensity and duration of these occupations resulted in localized physical impacts to the habitation site area, the extent of which had hitherto been seen. These impacts would have included extensive clearing of the site area and removal of the forest mat and compaction of the exposed soil by trampling. Late Archaic peoples would also have stripped the forests surrounding large base camps of deadfall, and perhaps selectively downed trees for additional fuel. Also perhaps undertaken on site was the excavation of large pit features for communal storage and other functions.

Again, the most pronounced environmental impact associated with Late Archaic settlement and land use is likely to have been the floodplain clearing by way of burning and other means. These activities would have disrupted the normal vegetative cover and promoted the establishment and maintenance of various succession stage communities in and around occupation loci.

Early Woodland Period (1,100 – 500 B.C.) (3,100-2,500 B.P.)

In contrast to the rather dramatic cultural shifts that define the Late Archaic, the transition between the Late Archaic and Early Woodland occurred along a continuum. While there are

common traits in material culture between the Early Woodland and the Late Archaic, significant shifts in settlement patterns appear to have accompanied the transition between the two periods. Eastern Virginia and the Lower James River in particular, appear to have experienced a retrenchment in human settlement during the Early Woodland. If the Lower James area indeed witnessed a significant reduction in settlement during this time, then one would expect a corresponding amelioration of land use impacts that characterized the preceding Late Archaic period. Known Early Woodland sites along the Lower James River appear to have been occupied for short periods of time and supported small scale, generalized hunting and foraging. These types of activities would not have resulted in appreciable impacts to the local environment. Consequently, the forest environment along the Lower James River during the Early Woodland may well have been characterized by a return to relatively undisturbed, climax conditions. Floodplains along the Lower James, the vegetation of which had likely been actively modified by Late Archaic peoples, transitioned to tidal wetlands or were fully inundated by around 1,000 B.C. resulting in a markedly changed natural landscape in the vicinity of the Rice Center.

The Middle Woodland Period (500 B.C. - A.D. 1000)

The Lower James River area witnessed a significant resurgence in settlement during the Middle Woodland. On the north side of the James, peoples appear to have spent a significant amount of time dispersed in small encampments, with interior stream valleys being a favored location for these settlements (Egghart 2004). Larger, more intensively occupied Middle Woodland sites have been documented on the south side of the James in the vicinity of the Rice Center. Based on carbonized seed remains recovered from archaeological investigations, some of the streamside sites north of the James were at least partially open and cleared during the times in which they were occupied.

Middle Woodland land use impacts along the James varied and were dependant on the size, intensity and duration of a particular site's occupation. Occupation of the interior streamside sites was relatively short term. These sites appear to have been geared to plant food exploitation and some of the site locations were purposefully cleared to promote the growth of economically valuable plant species. These small areas would have represented islands of plant species diversity within large tracts of climax forest cover. Land use impacts associated with the more intensively occupied sites on the south bank of the river were more substantial, and likely mirrored those of the semi-permanently occupied villages of the succeeding Late Woodland period. Although direct evidence is lacking, communal hunts, including fire drives may have been undertaken, particularly in suitable locations near period settlement nodes such as Maycocks Point and the Powell Creek environs. Such fire drives would have cleared deadfall and any understory from large swaths of forest, promoting a park-like character in areas where climax conditions were in place.

The Late Woodland Period (A.D. 1000 – 1607)

The Late Woodland period saw a significant increase in Native American population, the adoption of formal horticultural practices utilizing tropical cultigens, and a transition to semi-permanent village type settlement. These cultural trends were accompanied by significant impacts to the local environment. The most pronounced of these resulted from the clearing of

forest areas around village locations. The primitive farming practices of the time required that new field be opened as surface soils became depleted. As a result, areas around villages were characterized by a patchwork of breaks in the forest canopy, cleared fields interspersed with standing dead trees, and old fields in various succession states. The old field areas also contributed to the Native food resource base. Numerous plant species that typically colonized recently disturbed forest areas as known to have contributed to prehistoric diets. The most important of these were probably lambs quarter (*Chenopodium album*) but also likely included a variety of food bearing plants such as members of the Amaranth Family (*Amaranthaceae*) the Pokeweed family (*Phytolaccaceae*), Blackberry/raspberry (*Rubus sp.*) and others that thrive as components of early succession communities in disturbed areas.

Late Woodland peoples in eastern Virginia periodically conducted communal hunts for white-tail deer during the fall rutting season. Fire was used to drive game (Roundtree 1990) and this activity undoubtedly helped shape the forest landscape of the time. In a healthy climax forest, fire normally consumes deadfall on the forest floor and kills the understory, while leaving mature trees and the overhead canopy intact (Sutton and Sutton 1985). Native American use of fire to drive game helped shape and maintain the open character of some locations. During times of drought, some forest areas, particularly those damaged by wind storms or disease, would have been susceptible to a catastrophic burn event. Major forest fires, both natural in origin, and those intentionally or unintentionally caused by humans were probably not uncommon during major drought years.

In summary, Late Woodland use and modification of eastern Virginia's forests resulted in a landscape characterized by a variety of conditions. These included active cropland, open park-like woods, burn areas, and a patchwork of former occupation sites and horticultural plots hosting the range of succession communities, all interspersed between large areas of climax forest.

The Historic Period

Founding of Jamestown and the Virginia Company Period (1607-1624)

The Virginia Colony enterprise struggled to maintain its existence throughout the Company Period. During the first half of the Company Period, land use impacts along the Lower James River were negligible outside the limited number of fortified compounds in which the English remained encamped. Most of the food needed for the colonist's survival was shipped from England, or was traded for and/or coerced from the Native Americans. With the exception of the immediate footprint of the fortified English settlements, much of the Lower James River land remained in the same conditions as under the sole stewardship of Native Americans throughout the previous several centuries. This situation would rapidly change with the advent of tobacco cultivation. By 1619, English settlement began to rapidly expand all along the Lower James River shores. In the area of the Rice Center, Berkeley Hundred and Jordan's Journey were established that same year. In the following decades, the Lower James River environment was radically transformed as lands fronting the river were cleared en mass.

The Early Colonial Period (1625-1699)

Widespread clearing of forests during the tobacco boom precipitated dramatic and profound environmental impacts along the Lower James River. A direct and immediate effect was soil erosion and deflation. Plowing of cleared areas destroyed the forest humus and root mat, subjecting these areas to erosion and desiccation of the surface soils. Erosion was particularly pronounced along sloping areas or uneven terrain, and where soil texture and condition were favorable for movement to take place. Much of the top soil lost from the uplands ended in the local water ways, increasing sediment deposition along stream courses and on the James River bottom. The wholesale destruction of forest to accommodate tobacco cultivation is seen as having an immediate, negative effect on James River water quality. The exposure of bare soils across large areas would also have detrimentally affected near surface soil hydrology. Plowing would have in filled ephemeral upland wetlands and choked minor spring locations, resulting in reduced flow. By contrast, storm water runoff would have increased dramatically as a result of forest removal, causing bank erosion and channel migration along streams in the area. Overbank deposition resulted in accumulation of fine textured alluvium across these stream bottoms. Sheet wash and sloughing down the steep terrace slopes created minor colluvial fans extending into the bottomland. The combination of alluvial and colluvial deposition significantly altered stream bottoms such as that of Kimages Creek. The blanket of fine textured soil that collected across the bottom reduced soil drainage and resulting in generally boggy conditions along the stream margin. Not least of the environmental impacts was soil exhaustion brought on by tobacco. The tobacco monoculture of the boom years left large areas tracts along the Lower James severely depleted. Lesser quality agricultural land such as the Eastern Terrace of the Rice Center perhaps never recovered and was allowed to revert to forest following near the end of the 17th century.

The Colonial Golden Age (1700 – 1775)

Even though the population of eastern Virginia rose throughout the 18th century, impacts to the Lower James River environment did not increase commensurately. In contrast to the free-for-all land clearing of the tobacco boom, the advent of the Tidewater plantation system ushered in an era of more rational and sustainable land use practices. These practices, together with the abandonment and subsequent reforestation of more marginal lands along the river, likely helped ameliorate the environmental impacts associated with initial English settlement. On the other hand, the early 18th century saw the Virginia frontier move west from the Falls with the rapid settlement of the Piedmont region. Wholesale clearing of James River floodplains above the Falls is certain to have increased sediment load resulting in turbidity and the deposition of fine-textured sediment on the river bottom.

Although land use practices of the large plantations were more sustainable than those of tobacco boom years, 18th century agricultural practices were not without impact. Tobacco continued to be the primary cash crop and its cultivation left lingering effects on the land. Acreage whose soils had been depleted would have lain fallow and overgrown for a significant time before it could again be cultivated. Plowing of sloping terrain and other areas susceptible to erosion resulted in deflation of the soil column. With loss of surface soils to erosion, subsequent plowing would have cut deeper into the ground, bringing clayey subsoil up into the surface horizon.

The American Revolution and Federal Period (1776-1819)

Land use impacts dating to the American Revolution and the Federal Period are considered indistinguishable from those of the earlier 18th century. However, by the end of the Federal Period, the development of Richmond and Petersburg set the stage for increasing pollution associated with 19th century industrialization. Run off and silting associated with an intensifying agricultural use of James River Piedmont lands, although still relatively minor in scope, foreshadowed the degradation of the river's water in the coming century.

During the 18th and early 19th century, the Rice Center likely saw little change in its agricultural use. Even though these lands were likely effectively managed over a long term, normal agricultural activities still resulted on environmental impacts. Repeated tilling over many years is sure to have resulted in soil erosion and deflation. Loss of soil fertility is also certain to have been an ongoing detriment. The wooded portions of the Rice Center did not escape impact. Wooded areas, including the stream bottoms, were selectively timbered, either in small tracts, by thinning, or through the removal of specific, economically valuable tree species. These activities would have significantly altered the make up of local sylvan communities. Foraging by domestic and semi-feral hogs and other livestock would also have influenced the ecological character of forested areas of the Rice Center as well as the river shores.

The Antebellum (1820 –1860)

Rapid industrialization of Falls during the decades leading up to the Civil War resulted in direct impacts to the Lower James River environment. The growth of Richmond and Petersburg increased demand for food stuffs, fodder, timber, firewood, and brick clay. Much of this demand was met with resources provided by Lower James River lands. Urbanization resulted in raw sewage, animal waste, slaughterhouse offal, and industrial contaminants being dumped directly into the James. From a soil conservation standpoint, a positive development was the shift in tobacco cultivation from the Lower James shores to the southern Piedmont region.

Intensive agricultural land use and deforestation upstream from the Rice Center, particularly in the burgeoning Piedmont area, together with the rapid growth of Petersburg and Richmond is likely to have further negatively affected James River water quality. The silting over sand and gravel river bottom throughout the 19th century compromised the spawning and foraging habitats of several important native fish species, most notably Atlantic sturgeon. Sturgeon require hard bottom for spawning successes (Hager 2007). In addition to sediment loading stemming from unwise agricultural practices, the construction of navigation cut offs in the late 19th century and channel dredging in the 20th century resulted in the silting over of gravel beds and other hard bottom on which spawning sturgeon deposit their eggs (Hager 2007). This degradation played a major role in reducing the James River Atlantic sturgeon population from the spectacular levels seen in prehistoric and early colonial times, to its near extinction today. In addition, James River dams constructed to power Antebellum industries began to block passage of anadromous fish through the Falls, denying populations access to their traditional spawning areas upriver.

The extensive use of James River lands for pasture and grazing to support dairy, meat, and traction animals resulted in direct negative environmental impacts. Horses and cattle would have used the riverbanks to forage. Livestock would also have drank from the river and waded to cool off during the summer months (See Figure 6-1 for a period view of the James near Drury's Bluff

that shows the bank clear of tall vegetation and large areas of river shore contiguous with adjoining pastures). Trampling by livestock resulted in significant disturbance of shore line areas along much of the James River.

Civil War and Reconstruction (1861-1880)

The Civil War left localized but profound land use impacts to the Lower James River, including the Rice Center property. Following the Federal attempt to take Richmond in the spring of 1862, tens of thousands of troops encamped and foraged in the vicinity of the Rice Center. Though short-lived, these activities resulted in pronounced environmental impacts and alterations, some of which are still visible today.

At the conclusion of the Seven Days Battle in July of 1862, General McClellan moved the Army of the Potomac to Harrison Landing and Berkley Plantation where they could find cover from Union gunboats anchored in the James River. Upon arrival, men of the nearly 100,000 strong Army of the Potomac set about constructing an enormous series of U-shaped fortification trenches enclosing their position. The westernmost of these earthen fortifications lie within the Rice Center, where a double line of ditch and berm earthworks remains overlooking the east bank of Kimages Creek (Bennet 2005). These fortifications have been investigated archaeologically by Virginia Commonwealth University students under the directions on Dr. Amber Bennet. Test excavations showed that the earthworks were fastidiously constructed and incorporated post-in-ground barricades. The Union forces remained encamped in hastily constructed shelters for approximately six weeks, after which the troops were loaded on transports and sailed north, ending the Federal attempt to take Richmond by way of the Virginia Peninsula.

Even though the Union encampment lasted only a month and a half, the resulting environmental impacts were profound. Construction of the fortifications alone physically altered the landscape. Further, the ecological effects of 100,000 men occupying in very small area were equally dramatic. The camp was occupied not only by the soldiers but also by almost thirty thousand horses, draft animals and livestock that supported the Union forces (Sears 1992). The physical disturbance resulting from trampling by both men and animals and the construction of shelters, latrines, and other camp infrastructure left the ground surface of the entire occupation area churned and denuded of vegetation. A Union officer Lieutenant Charles Haydon aptly summarized these conditions writing in a letter home that “we camped in mud and slept in mud” (Sears 1988:223). This extensive disturbance likely resulted in significant soil erosion and deflation in places, as well as the physical displacement material within the soil column.

Trees or other vegetation in front of the defensive works were cleared by the Union troops in order to provide open fields of fire. The Union troops would also have felled trees to be used in fortification architecture such as puncheons and revetments, burned as fuel, or used in temporary constructions raised to provide shelter from the summer sun and thunderstorms. Figure 7-1 shows a period photograph of Union earthworks constructed at Bermuda Hundred in 1864. The defensive works were constructed under similar operational circumstances as those on the Rice Center; in this case following a stalled Union offensive against Confederate position on the south



Figure 7-1 Union Fortifications at Bermuda Hundred

The Union fortifications at Bermuda Hundred were constructed under similar operational circumstances as those on the Rice Center. In May of 1864, Major General Benjamin Butler moved on Richmond from the south bank of the James as part of a coordinated Union attempt to simultaneously engage the Confederates in all the theaters of operations. General Butler's drive on Richmond floundered and his forces withdrew to Bermuda Hundred to camp behind fortifications (above). Note the modification of existing terrace landform to create a pronounced ditch and berm. Several other features likely mirror the Rice Center fortification of 1862 including: 1) Total removal of trees and vegetation for open fields of fire; 2) Use of tree limbs to create an entanglement barrier in front of the ditch; also note brush on berm face; 3) Extensive use of revetments and post in ground architecture (foreground). Evident in the image is extensive erosion resulting from denuding of vegetation. Also note standing pine shade trees.

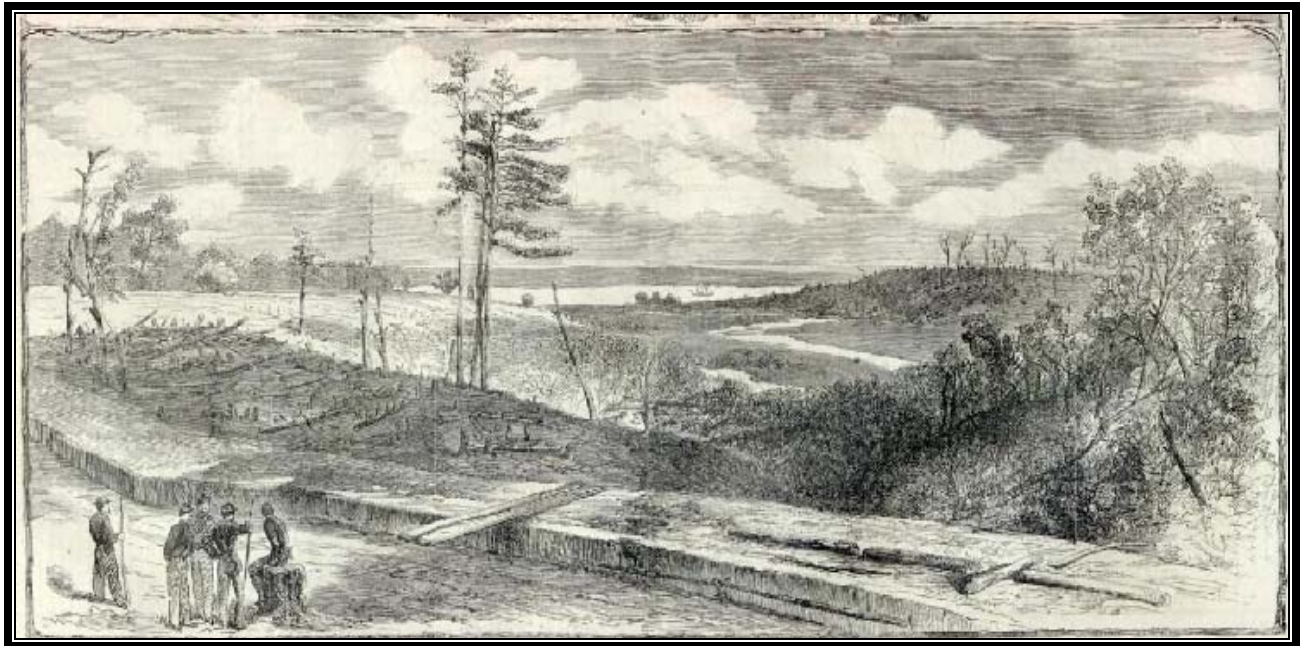
side of the James. The photograph clearly shows the extensive disturbance, deforestation, and erosion associated with a construction and manning of a major Civil War fortification.

No photographic images of the actual fortifications at Harrison Landings are known to exist. However, a war correspondent sketch (Waud 1862) of the area was published by Harpers Weekly depicting the view from the fortifications down and across the Kimages Creek valley towards the James River (Figure 7-2). The rendering graphically depicts the environmental impacts resulting from the transformation of the Rice Center lands into a defensive strong point. In addition to the actual ditch and berm excavation along the landform crest similar to what was seen at Bermuda Hundred, the forests along both sides of Kimages Creek were cleared. The sketch as well as its accompanying narrative indicates that some of the felled timber was burned off. On the eastern side of Kimages Creek, cut trees were arranged to create entanglements. The Harpers Weekly correspondent (Waud 1862) describes this devastation to the Rice Center setting:

“Kimages Creek forms the defense of the extreme left, and is as impassible as the creek on our right. It is a savage-looking hollow, filled with felled and burned trees, dense with shrubbery, marsh and water.”

It is also likely that some shore line filling and temporary quay construction was undertaken along Harrison’s Landing to accommodate the docking of Union supply and transport vessels. Figure 7-3 shows a Civil War period view of the Union supply wharves/landings at City Point and clearly illustrates associated land and shoreline impacts. Similar, albeit somewhat less intensive disturbances likely occurred adjacent to the Rice Center as a direct result of the encampment, resupply and ultimate embarkation of the Union forces during the summer of 1862.

Although the Rice Center area was not subjected to a level disturbance that the land had to be abandoned, impacts left by Civil War armies were nonetheless lasting and substantial. These include the highly localized but extensive recontouring of the ground surface in the construction of earthen fortifications, and wide scale devegetation and timbering. Secondary impacts included erosion and an extensive reworking of the surface soils in and around the camp area. These effects are likely to have lingered for many years following the Civil War. Some elements, such as the earthen fortifications remain visible to this day. These scars on the landscape serve to remind us of the struggle and sacrifice during what can only be described as the most difficult times ever faced by our country.



Source: Harpers Weekly August 1862

Figure 7-2 View of Kimmages Creek and Rice Center Western Terrace from Union Fortifications Surrounding Harrison's Landing

Figure 7-2 shows much of the southern half of the contemporary Rice Center on both sides of Kimmages Creek as seen from the Union fortifications surrounding Harrison's Landing. The drawing was produced to accompany a war correspondent's report from the Army of the Potomac's encampment at the end of the Peninsular Campaign published in Harpers Weekly August 1862. The image shows the near complete deforestation of the area undertaken to enhance the Union defensive position. This clearing was extended to encompass the Western Terrace on the far side of Kimmages Creek. The Harper Weekly correspondent described the left defense of the Union position as follows:

Kimmages Creek forms the defense of the extreme left, and is as impassible as the creek on our right. It is a savage-looking hollow, filled with felled and burned trees, dense with shrubbery, marsh and water.

The above account suggests that some of the felled timber was burned to deny attacking forces potential cover. The drawing seems to depict the Western Terrace as cut over and burned. Felled timber closer to the trench line on the Eastern Terrace appears to be arranged to create entanglements as was typical military practice of the time. Also of note is that the actual creek bottom is depicted as open in the drawing. This strongly suggests that this area had been actively used for browsing livestock.



Figure 7-3 View of Union Supply Wharves at City Point

Figure 7-3 shows the Union supply wharves at City Point looking upstream towards the mouth of the Appomattox beyond. Land use impacts are considerable in the photograph. Note the devegetation and erosion of the bluff faces in upper left. Horse wagons are seen unloading on what appears to be filled in land created to allow access to deepwater anchorage. At present day, the entire area appears to have been reclaimed by the James River. The Kimages Wharf located along the downstream limits of the Rice Center would have seen similarly heavy river traffic bringing supplies for the Union troops encamped at Harrisons Landing following the unsuccessful attempt to take Richmond during the 1862 Peninsular Campaign (See Figure 6-2 for Kimages Wharf location)

Dawn of the Modern Age (1881-1899)

The last two decades of the 19th century was a period of rapid growth and ongoing industrialization in the Richmond area. This growth increased demand for local agricultural output. Horses continued to power most local transportation modes, as well as period agricultural machinery and other farm workings. Consequently, significant acreage would have been needed to produce hay and other feed. Demand for timber and forest products also increased dramatically, apparently prompting the harvesting of some remaining forest stands along the James River, including tracts adjacent to the Rice Center (See Figure 6-3 and Figure 6-4). During these years, some lands along the Lower James River were cut of forest and land put back into agricultural production. On a national scale, farm acreage neared its peak in the late 19th century. Across much of the South, freed slaves acquired or leased land, often of marginal quality and attempted to support themselves through farming. In Appalachia and across the West, an expanding rail network facilitated the wholesale clear cutting of vast timber stands that had previously remained untouched. Locally, impacts associated with historic clear cutting practices included soil erosion and increased run off. The amount of sewage and industrial pollution entering the James River increased significantly as Richmond continued to grow. Erosion associated with intensive farming, timbering and other land clearing activities within the James River watershed resulted high rates of sedimentation of the river bottom. This sediment build up contributed to demise of Richmond as a viable deepwater port during the last decades of the 19th century.

Early 20th Century (1900-1929)

At the beginning of the 20th century, the nation began to come to grips with the wholesale degradation of its forests and rural lands. In response, the federal government implemented sweeping land conservation measures. The laws chartering the U.S. Forest Service were passed around the turn of the 20th century. The new agency was given the mandate not only to establish sustainable forest harvest practices, but also to manage vast federal lands for soil conservation and watershed protection. The Dust Bowl of the Depression years further underscored the dire consequences of the unfettered agricultural land use. The USDA Soil Conservation Service was founded in 1935 largely in recognition of the continuing land crisis facing large parts of rural America.

The Lower James River shores did not experience the full destructive effect of unwise late historic land uses to the degree seen in the depression era Southern Plains, or in the deforested uplands of the Appalachians during the 19th century. However, nearly 300 years of intensive land use clearly left its mark. Impacts included soil erosion and deflation, depletion of soil nutrients and the silting in of local waterways.

On the Rice Center proper, the Kimages Creek valley was clear cut to accommodate the Lake Charles impoundment. This represents the second time the area was cut in 65 years. The bottomland flanking the unnamed stream on the Rice Center appeared to have been cleared of

timber sometime prior to 1907 (See Figure 6-4). The mining of fill soil along the base of the river bluff for dam construction left a permanent disturbance in that area. Construction of the dam also resulted in the silting in of the embayed Kimages Creek channel below the impoundment.

Great Depression and World War Two (1930-1945)

The decades following the onset of the Great Depression saw a reduction in agricultural land use as marginal acreage was abandoned. Some of the abandoned acreage bore the lasting and cumulative effects land use impacts dating back to early colonial times. Impacts to the soil included erosion, deflation, physical disturbance, loss of forest litter, and the depletion of nutrients. Today, regenerative vegetation in the historically worst impacted areas of eastern Virginia consists not of the mixed, climax forest characteristic of pre-colonial times, but rather thin pine woods. With time, these areas will eventually recover if further left undisturbed. However, the tree growth rates in some forest areas, including the Rice Center undoubtedly remain to some degree impeded by the detrimental environmental effects of nearly 400 years of intensive land use.

Modern Era (1946- Present)

Use of the Rice Center property as a YMCA camp in the years following World War Two was also not without environmental consequences. The construction of numerous shelters and other structures with minimal site preparation resulted in compaction soils in and around the building foot print. In the absence of well developed roadways, vehicle movement and pedestrian traffic also resulted in significant soil compaction. These areas are discernible by the exposed soil and differential vegetation growth patterns that have lingered long after the buildings have been demolished, and are in fact discernible in contemporary air photos.

Modern timbering and related activities have left a significant ecological mark on the Rice Center. Most of the agricultural field areas on the Western Terrace were planted in pine sometime in the 1940s. More significantly, much of the Eastern Terrace was timbered and planted in loblolly pine during the late 1970s. The latter action has left much of this portion of the Rice Center vegetated in stands of pure loblolly.

The action may represent the first time since initial colonial settlement that the Rice Center forest was subjected to clear cutting. Prior, minor stands of economically valuable timber, as well as individual tree specimens were likely selectively removed through a process known in contemporary forestry practices as “high grading”. High grading is likely to have been undertaken on the Rice Center throughout historical times. The most sweeping episode of selective harvesting seems to have occurred in the middle of the 20th century when mature pines were apparently removed from much of the Eastern Terrace (See Figure 6-5 and Figure 6-8).

Across the Lower James River area, residential construction and associated development represents the greatest land use impact during the post-World War Two era. Until very recently most development along the Lower James River consisted of individual home sites. Prime farmland along river terraces remained under cultivation. In the first decade of the 21st century, some of this prime farmland that had been in cultivation since early colonial times was slated for development. Land use impacts associated with modern residential development are nothing

short of profound. These impacts include removal of all vegetation, localized recontouring of landform contours and wholesale alterations to surface drainage patterns.

In the 1960s, pollution of the nation's waters including the James River, reached a crisis point. This degradation prompted a sweeping national response. As a result of the Clean Water Act and other federal legislation, significant improvements were made to municipal wastewater treatment capabilities. Other actions that helped stem the decline in James River water quality were ongoing efforts by the City of Richmond to separate storm water and sanitary water sewer systems to prevent untreated sanitary wastewater discharge during major rain events. Efforts to curb pollution related to land use activities have been less successful. Today runoff from agricultural fields and from animal feeding operations remains a serious threat to the water quality of the Lower James River and the Chesapeake Bay estuary as a whole. Runoff carrying chemical pollutants and excessive nutrients from urban/suburban areas also remains a serious problem. Water turbidity due both to suspended sediments and biological factors, continues to plague the James. The latter condition is closely linked to a drastic decline in submerged aquatic vegetation, the presence of which is critical to a healthy and biologically diverse river ecosystem.

Review of Lasting Environmental Impacts of the Civil War

The Civil War brought extensive and dramatic impacts to the Rice Center lands. These impacts, which include wholesale timbering and burning of the forest cover as well as the construction of extensive earthworks fortifications acted to radically reshape the local environment. However, in contrast to other locations which were essentially abandoned in the decades following the Civil War, the lands around Berkley Plantation and Harrison Landing were largely restored to their original condition. This is likely due to these river-fronting lands having remained prime real estate following the conflict. On the other hand, the eastern portions of the Rice Center were allowed to revert to forest, resulting in the preservation of the earthwork sections we see today. In addition, the lasting environmental effects of the Union occupation may have remained manifested in other ways, including the makeup of the local vegetative communities. Specifically, it is proposed that the environmentally disruptive, fortified occupation of Harrison Landing in the summer of 1862 fostered the establishment of a pine dominant forest along the southeast corner of the Rice Center. In examining the 1937 air photo of the Rice Center, the southern limits of the Eastern Terrace appear to be forested in mature pine (See Figure 6-5). This area had been selectively timbered by the time the 1953 air photo was taken (See Figure 6-8). It is possible, or even probable that the extensive ground disturbance and (partial) clearing of the Eastern Terrace during the Civil War resulted in conditions favorable for the growth and maintenance of local pine species, presumably loblolly. The 1862 Harpers Weekly illustration (See Figure 7-2) clearly shows individual mature pine trees having been left in place along the river fronting portions of the Eastern Terrace. In contrast to the complete deforestation depicted along Kimages Creek and the Western Terrace, the Eastern Terrace was only partially cleared with individual (pine) trees left standing to provide shelter from the sun (see Figure 7-1 showing shading pines left within the fortification). It is postulated the existence of the mature pine stands depicted in the 1937 air photo is at least in part attributable to Civil War era activities. Further, in examining the 1937 air photo, one can see that the break between a deciduous and a pine dominant roughly correlates with the fortification line. It is further postulated that the extensive

disturbance associated with the Union encampment fostered the longer term maintenance of pine dominant forest community in that area.

In regard to the stands shown as timbered in the 1953 air photo, it is perhaps no coincidence that these mature (ca 80 year old) pine trees were likely harvested around the time the post World War Two construction boom would have raised both the demand for and price of lumber. Loblolly pine can typically reach 150 years in age (Taber 1995). Had these stands not been harvested, it is likely that some old growth pines would still grace the terrace edges overlooking Kimages Creek providing a tangible, living connection to the Civil War history of the Rice Center lands.

Summary of Human Land Use Impact to the Rice Center

As detailed in this section, the Lower James River has long been subjected to extensive land use impacts, some of which date back to prehistoric times. Appreciable environmental impacts associated with prehistoric settlement began around 4,500 years ago when Native American began to modify floodplain environments through use of fire and other means. In the area of the Rice Center, the James River floodplain areas suitable for such activity have been inundated by rising sea levels. Later in prehistory, land use impact specific to the Rice Center itself were limited to very minor clearing around short term occupation sites and perhaps to the use of fire to drive game during communal hunting activities. This activity would have resulted in the maintenance of an open, park-like character of the Rice Center forests.

Undoubtedly, the most environmentally destructive impacts occurred as a result of widespread land clearing during initial English settlement. It is a safe assumption that some of the land cleared during the early and mid-17th century was allowed to revert to forest following the tobacco boom years. As a part of a major James River plantation holding, the Rice Center lands were effectively managed for much of the 18th and early 19th centuries. During this time, the property's use as pasture land, forest and wood lots is unlikely to have resulted in extensive environmental impacts. The Civil War use of the property again resulted in devastating environmental impacts including clearing and burning of forest cover and extensive landscape disturbance. Following the Civil War, parts of the property again reverted to forest while limited areas such as the Western Terrace remained in agricultural use. Farming on the Rice Center ended some time in the late 1930s, or perhaps the early 1940s. Throughout the historic period portions of the Rice Center forests were likely subjected to selective timber harvesting. The most pronounced episode of selective timber harvesting occurred sometime after 1937 (probably immediately following World War Two) when mature pines were removed from the southern half of the Eastern Terrace. The post-World War Two use of the Rice Center as a summer youth camp resulted in highly localized but ongoing impacts including soil compaction, devegetation and soil erosion. In the late 1970s, much of the Eastern Terrace was clear cut and replanted in loblolly pine.

Table 7-1 summarizes these land use impacts specific to the Rice Center setting.

Table 7-1 Land Uses Specific to Rice Center

Prehistoric	
Time Period	Human Land Use Impacts
Paleo-indian 9,500 B.C. – 8,000 B.C.	No direct human impacts to Rice Center
Early Archaic 8,000 – 6,500 B.C.	Marginal impacts, trampling and minor clearing around habitation sites, if present
Middle Archaic 6,500 – 2,500 B.C.	Marginal impacts, trampling and minor clearing around habitation sites
Late Archaic 2,500 – 1,100 B.C.	Increasing impacts; burning of floodplains, minor forest clearing; extensive trampling, clearing and firewood removal around longer term habitation sites
Early Woodland 1,100 – 500 B.C.	Decrease in impacts commensurate with reduction in settlement and land use; Rice Center may have remained largely untouched by human activity.
Middle Woodland 500 B.C.- A.D. 1000	Increase in settlement in area, some clearing of stream bottoms, some clearing of forest for horticulture and communal game drives possible on Rice Center
Late Woodland A.D. 1000 - 1607	Little or no actual settlement on Rice Center. Impacts likely limited to clearing of forest understory and deadfall as a result of fire drive conducted in area.
Contact Period A.D. 1607 – ca. 1624	Continuation of Late Woodland land use practices. Minimal and highly localized Initial European impacts
Historic	
Time Period	Human Land Use Impacts
Company Period 1607-1624	Minimal and highly localized Initial European impacts; some increase in clearing near end of period
Early Colonial 1625-1699	Extensive land clearing for tobacco cultivation; wide spread soil erosion, deflation and exhaustion, excessive sedimentation of stream bottoms
Colonial Golden Age 1700-1775	Continued erosion and soil deflation. Soil fertility stressed by ongoing tobacco cultivation. Rational land use practices on major plantations holdings
American Revolution Federal 1776-1820	No major changes in land use impacts
Antebellum 1821-1860	Continual agricultural use. Continued soil erosion/deflation. Increased sedimentation in James River associated with Piedmont land clearing.
Civil War and Reconstruction 1861-1880	Portions of Rice Center heavily impacted by fortifications construction and by encampment activities of a large Union Army.
Dawn of the Modern Age 1881-1899	Some new land clearing. Abandonment of part of Western Terrace for agricultural use.
Early 20 th Century 1900-1929	Construction of Lake Charles impoundment.
Depression/World War Two 1930-1945	Abandonment of remaining agricultural land. Selective timbering, pine planting and forest regrowth.
Modern 1946- Present	Ongoing impacts by YMCA camp activities. Full preservation in the 21 st century

The following Section 8 synthesizes the specific land use impacts detailed in this section with the naturally occurring changes in the local environment in order to arrive at an interpretive reconstruction of the Rice Center through time.

Section 8 The Rice Center Through Time: An Interpretive Synthesis of Natural Changes and Human Impacts along the Lower James River

Introduction

The preceding sections have provided: 1) an account of the physiographic setting and baseline environmental condition of the contemporary Rice Center; 2) a review of the natural and cultural history of the Lower James River; 3) summary of local human settlement and land use; and 4) analysis of the environmental impacts associated with this settlement and land use. The following section synthesizes this information into an interpretive summary of the Rice Center through time. While the naturally occurring changes are charted, emphasis is on how human land use helped shape the Rice Center environment through time. Traces of human activities, together with constructs such as houses, fences, roads and other features define the cultural landscape of the area. Historic period interpretive reconstructions of this cultural landscape from the mid-19th century onwards draw on previously referenced primary sources including period maps and photographs. Earlier reconstructions rely on ethnohistorical accounts, archaeological studies, and paleo-environmental data also referenced in the preceding sections. Together these sources are engaged herein to assemble an interpretive reconstruction of the Rice Center from approximately 11,500 years ago through the present day.

The Prehistoric Period

The Paleo-Indian Period 9,500 – 8000 B.C. (11,500-10,000 B.P.)

The first Native Americans to view the Lower James River beheld a scene very different from what we see today. Instead of a broad tidal estuary, Virginians of 11,500 years ago witnessed a much narrower, free flowing James bracketed by a wide floodplain. Within the channel, minor point bars and exposed sand/gravels beds lined the river's bends.

The James floodplain contained natural levees, backwater areas, and flood chutes typical of free flowing rivers. Natural levees were present along the river edge; formed as a result of floodwaters overtopping the channel margin. During a flood event, the river waters slow once out of the main channel, causing medium textured particles such as fine sands to drop out of suspension. Over time these deposits accrete to form a low, ridge-like natural levee. Flood chutes occurred behind the levees. Despite their name, these low areas normally did not channel high energy flow, but rather captured water overtopping the levees. This water ponded as the river subsided. As a result, many flood chutes contained fine, silty soils that remain poorly drained. Catastrophic flood events could cut new channels through the levee and across the adjoining bottom land. These disruptions would typically infill with coarser sands and fine gravels deposited by the higher energy flow captured during subsequent flood events. Floodplain on the river side of the levee adjacent to the channel were heavily scored and continually reworked over time.

A typical cross section of the James River floodplain included: 1) a low, scoured frequent floodplain immediately adjacent to the river bank; 2) a natural levee consisting of a low sandy ridge or ridge sections paralleling the river; and 3) poorly drained flood chutes and backwater areas. This undulating pattern could be repeated further back from the river as relic features left in place when the main channel migrated in the opposite direction. Kimages Creek and the unnamed drainage bordering the Rice Center cross cut the wide James River floodplain in narrow entrenched channels, perhaps turning in places to follow the river orientation along a flood chute or the back side of a natural levee for a distance before again bending to meet the James River main channel.

The climate of the time was characterized by temperatures as much as 10 degrees Celsius cooler than today. Cooler sea surface temperatures produced persistent cloudiness during certain times of the year. Precipitation levels, however, were lower than in contemporary times. Nonetheless, snow cover was prevalent across the Coastal Plain for much of the long winter. Forests were dominated by spruce and white pine. Tall, stately conifer trees covered the terrace tops and slopes of the Rice Center. Relatively little undergrowth existed on the darkly shaded forest floor; typically lichens, mosses and similar species that thrive in a cold climate. The floodplains of the James may have been relatively open and vegetated in sedges and grasses. Between 11,000 and 9,000 years ago, the climate warmed rapidly and the late glacial vegetation began to give way to a more diverse forest cover. White pine continued to dominate the upland terraces of the Rice Center, while birch, alder, and increasingly maple began to flourish along the adjoining stream bottoms and the expansive James River floodplain.

Paleo-indian populations along the Lower James River were very small and direct land use impacts of were minimal. Although Paleo-indians are certain to have passed through the area on their hunting rounds, these folk are unlikely to have lived on the Rice Center itself.

The Early Archaic Period 8,000 – 6,500 B.C. (10,000-8,500 B.P.)

During the Early Archaic period, a rapid warming and drying of the climate fostered the spread of deciduous tree species. Spruce and white pine forests retreated rapidly northwards and by the end of Early Archaic, essentially modern forest conditions prevailed along the Lower James River. These conditions were characterized by a predominance of oak and hickory on the higher terraces, with wet adapted species such as red maple, beech and yellow poplar covering the bottomlands.

The James River continued to flow within a relatively narrow channel bordered by expansive floodplains. Physically, these floodplain areas remained largely unchanged from the previous millennia. However, sea levels were rising rapidly and the Atlantic shore line was moving steadily westwards towards its present day location. During the first millennium of the Early Archaic, rising ocean waters first began backing into the confluence of the James River and the ancestral Susquehanna channel in the area of Hampton Roads, marking the beginnings of the Chesapeake Bay estuary. Climax hardwood forest conditions became fully dominant across the region by the end of the period.

Early Archaic hunters and foragers camped in and around the Rice Center, exploiting the rich and abundant plant and animal resources offered by the expansive James River floodplain and adjoining forested uplands. Camp locations varied with the season. The low terraces overlooking

present day James River shore east of Kimages Creek were likely a favored location. Other probable Early Archaic site locations include interior portions of Kimages Creek and other nearby low order drainages, as well as upland terraces settings overlooking minor stream heads or where springs were present. This human activity left relatively little traces on the landscape, beyond minor clearing of the encampment sites.

The Middle Archaic Period (6,500 B.C. – 2,500 B.C.) (8,500 - 4,500 B.P.)

During the Middle Archaic, the Lower James began to exhibit profound physical changes that would culminate in its transformation from a narrow, free flowing river to a broad tidal estuary. Rising sea levels and an encroaching Chesapeake Bay reduced the gradient of the James, causing its current to slow and the channel to meander. As sea levels continued to rise, the river began to cut multiple, braided channels. By around 5,000 BP, the waters in the area of the Rice Center began to be tidally influenced. Toward the end of Middle Archaic, the long lasting drying and warming trend may have resulted in minor open areas and breaks in the forest cover.

Peoples of the Middle Archaic lived and traveled in small groups, hunting and foraging across the vast deciduous upland forests that characterized the landscape. The climate continued to warm and dry, resulting in further expansions of the oak, hickory and other warm adapted tree species. A Native American standing on the Rice Center terrace overlooking the present day James would have beheld not one river channel, but two or more meandering courses winding through an expansive floodplain. The terrace on which he or she was standing did not front the James River as it does today. Rather, Eppes Creek was contained in a narrow channel at the foot of the bluff. A long, wide stretch of floodplain separated Eppes Creek from the James River beyond. After following a relatively straight course along the terrace base, Eppes Creek turned to meet the James near present day Harrisons Landing. The now drowned Eppes Creek channel is clearly discernible in contemporary USGS quad with bathymetric contours (see Figure 6-5). The meandering James River channels of the day were flanked by point bars, sand/gravel beds and other fluvial shoreline features.

The Rice Center itself was in climax forest, consisting of stately oak, hickory and other hardwood species. Forest fires, both from natural ignition sources and perhaps cultural (accidental) in origin were not uncommon, particularly during times of drought. These fires would sweep through the forest, consuming leaves and minor deadfall while leaving the mature trees largely intact. Occasionally, some forest areas such as those that had experienced disease outbreaks or significant storm damage would burn cataclysmically, leaving the area open to be claimed by early succession plant communities. Older burned areas hosted mixed pine and hardwoods as the forest reestablished itself and slowly transitioned back towards a climax state.

Human land use impacts mirrored those earlier times. These impacts were characterized by minor clearing and trampling or vegetation in and around occupation sites. There is no direct evidence that Middle Archaic people used fire to drive game or to modify the local forest environment. These people were proficient hunters and foragers, subsisting in large part on the resources offered by the deciduous upland forests of the time. River shores/floodplains and the developing inland wetland margins were also productive settings that helped support slowly growing Middle Archaic populations. On the Rice Center, upland terraces overlooking stream heads are likely to contain minor encampments. The low terrace on the east side of Kimages

Creek is known to have been intermittently occupied during the Middle Archaic period. Some of these site locations may have been seasonally revisited by the same group year after year. These repeat site visits would have resulted in the clearing out of forest litter and soil compaction in the center of the campsite. The immediate vicinity of campsite would have been cleaned of dead fall to provide firewood.

The Late Archaic Period (2,500 – 1,100 B.C.) (4,500 - 3,130 B.P.)

At the beginning of the Late Archaic period, the James River still flowed in multiple channels across a broad floodplain. With rising sea levels, the river current slowed and tidal influence moved steadily upriver. By the end of the Late Archaic around 1,000 B.C., rising sea levels had fully transformed the Lower James River into the broad tidal estuary we see today. As the waters rose, the river began to exceed the channel margins, turning the lower lying floodplain areas into tidal wetlands. Rising waters also began backing up the minor drainages feeding into the James, embaying the creek mouths. Along the main river channels, point bars and other fluvial features carved out during earlier times remained partially exposed. During times of low water and dry conditions, these sediments would be mobilized by wind. Wave action also resulted in erosion along the river terrace face, precipitating slumping and calving, providing additional material for localized aeolian soil transport. Further rise in water levels flooded these areas and by the end of the Late Archaic the former broad floodplains that had flanked the James channels consisted of series of broken islands, surrounded by transgressing tidal waters.

A focused orientation on estuarine and other resource rich environments allowed Late Archaic people to spend extended periods of time encamped in one place. Strategic locations including stream/river confluence such as the Eastern Terrace of the Rice Center at the mouth of Kimages Creek were repeatedly occupied for relatively long durations. Effects of these activities likely included the clearing of habitation areas, trampling of vegetation, and the localized reworking of soils as a result of storage pit excavations and other earth disturbing activities. Deadfall was stripped of the area and some trees may have been killed by girdling or downed outright to provide firewood, leaving open gaps in the climax forest canopy. Late Archaic peoples also may have conducted fire drives in communal hunts and probably practiced selective burning of forest areas to promote and maintain economically valuable, early succession plant communities. As a result of these interventions, forests along the James River were highly diverse and included open burns, new growth, and areas in various succession stages, interspersed by large areas in climax state. Together with the effects of a long standing warm and dry climate, human use of fire may have fostered the localized occurrence and maintenance of minor grassland areas.

The Early Woodland Period (1,100 – 500 B.C.) (3,100-2,500 B.P.)

A decline in human settlement and intensity of land use along the Lower James River during the Early Woodland had a significant effect on the local environment. Without ongoing human disturbance, forest areas that had been subjected to burning and other cultural impacts transitioned back towards a climax state. Mature oak and hickory began to dominate at the expense of pine species. Succession communities were limited to areas of recent natural disturbance such as those associated with wind breaks or natural fires. The warm and dry climate characteristic of the Late Archaic moderated during the Early Woodland. Additional moisture likely reduced the occurrence of natural fires and hastened the entrenchment of climax forest

conditions. Any grassland or open areas would have closed in and been subsumed into large, nearly unbroken expanses of mature deciduous forest.

The beginning of the Early Woodland marked the full development of the Chesapeake Bay estuary system, including the tidal portions of the Lower James River. During the Woodland period sea level continued to rise, albeit at a greatly reduced rate. Broad islands remained mid-river in front of the Rice Center. With time, these islands shrank as waters continued to rise. At some point, remnants of the multiple James River channels, as well as the Eppes Creek channel at the foot of the Rice Center terrace bluff, fully merged to form the broad estuary we see today. Rising tidal waters also encroached upon adjoining stream valleys, creating bands of narrow wetlands along the drainage margins. Sheltered coves such as the one carved by Kimages Creek and the unnamed stream on the upstream side of the Rice Center property, supported hydrophilic tree species and bottomland plant communities. Stands of cypress were probably established during this time. Other trees flourishing in these lowlands included red maple, poplar and beech, providing some variation in the expansive hardwood canopy that dominated the surrounding uplands.

The Middle Woodland Period (500 B.C. - A.D. 1000)

An increase in human settlement characterized the Middle Woodland along the Lower James River. On the south side of the James, the Maycocks Point and the Powell Creek environs were intensively occupied for extended periods. Clearing of forest tracts was undertaken to create open space for settlement, provide firewood, and to promote economically valuable succession communities. On the north side of the river, Middle Woodland peoples made extensive use of minor streamside settings. Interior portions of smaller drainages such as Kimages Creek were favored locations for short-term encampment type settlements. Many of the camps were geared towards the exploitation of wild plant foods and some were at least partially cleared of forest cover during the time at which they were occupied. These sites would have had breaks in the canopy with stream bottoms densely vegetated in secondary growth as a result of sunlight reaching the forest floor.

From the vantage point of the Rice Center terrace over looking the James, Maycocks Point and surrounding south bank of the James would have appeared as broken forest and individual plots of open land. The Rice Center uplands themselves were likely in oak-dominated climax forest, perhaps with the forest floor kept free of litter and undergrowth by occasional fire game drives staged by the inhabitants of the major settlements across the river. Stream valleys were also forested, with occasional breaks in the canopy around the campsites where trees had been killed and/or downed to bring sunlight to the rich and productive stream bottoms. The James River waters continued a slow, steady rise. Tidal waters backed well into Eppes Creek and the intermediate order drainages on the south side of the river. Though reduced in size over the centuries, numerous islands still studded the mid-river area. The broad floodplain that once separated Eppes Creek from the James directly in front of the Rice Center remained as expansive tidal wetland, likely supporting emergent vegetation.

The Late Woodland Period (A.D. 1000 – 1607)

High terrace settings such as the Rice Center uplands were generally not selected for long term occupation during the Late Woodland. The nearest known Late Woodland village was on Jordan's Point, located across the James from the Rice Center. Prior to the site's abandonment around the time of Jamestown's founding, extensive Native American alteration to the landscape around Jordan's Point would have been clearly visible from the north side of the river. Much of the James River shore in the area of Jordan's Point consisted of a mix of open fields, patchy woods, and new growth forest. Also visually prominent were the hulks of standing dead trees which had been killed by being stripped bark to open new plots for cultivation. The geographic distribution of these impacts was fluid as villages were periodically moved to new locations. Additional areas of forest were progressively cleared around the new villages while the abandoned settlement locations slowly returned to their former, natural states. Natives Americans were compelled to undertake these relocations because of the cumulative impacts their own presence had on the local environment. These impacts included soil exhaustion, depletion of readily usable firewood, and a shortage of game due to over hunting.

The Rice Center itself was unlikely to have been settled during the Late Woodland. However, the triangular, three-sided high terrace west of Kimages Creek (Western Terrace) may well have been the location of fire game drives over the span of the Late Woodland as the landform is ideally suited for such activity. The resulting removal of any undergrowth and dead fall during fire drives would have promoted an open, park like character of the climax forest across the upland terraces. Given the prevalence of white oak in the modern forest make up, this species also was likely prominent during though latter prehistory.

The Historic Period

Founding of Jamestown and the Virginia Company Period (1607-1624)

European land use impacts in the immediate Rice Center environs were limited in scope during the first decade of the Company Period. European settlements along the Lower James River were widely dispersed, and limited in size. The nearest Company Period settlement to the Rice Center was Shirley Hundred, located on the upstream end of Eppes Island. Native American land use remained the primary human influence on the local environment in the vicinity of the Rice Center, with these effects concentrated on the south side of James. This situation changed dramatically around 1619 when restrictions on private land grants were eased and the immensely profitable cultivation of tobacco took hold in the colony.

Berkeley Hundred and Jordan's Journey were both founded in 1619, around the time the Virginia colony began to grow in earnest. A typical practice in the establishment of late Company Period settlements was to utilize open or partially open lands that had recently been abandoned by Native Americans. However, the burgeoning demand for tobacco land soon resulted in extensive clearing of virgin forest. This wholesale clearing would shape the face of the Lower James River for centuries to come.

The Early Colonial Period (1625-1699)

The 1620s and 1630s was a period of rapid European expansion along the James River and ever greater amounts of land were cleared of forest. The consumptive land use practices brought on by the tobacco boom resulted wide spread and wholesale degradation of the Lower James River environment. In addition to the loss of forest cover along the James River shores, environmental impacts directly associated with tobacco-driven European settlement and included intensive soil erosion/deflation, soil exhaustion, and the silting of streams and infilling of ephemeral hydrological features.

The low lying terraces near the Berkeley Manor house and Harrisons Landing were likely the first areas cleared for tobacco cultivation in the vicinity of the Rice Center. Portions of these low terraces may have been partially open as a result of Native American land use activities when Berkeley Hundred was founded in 1619. On the opposite side of the James River, the Jordan's Journey settlement was constructed amid fields recently abandoned by Native Americans. With the burgeoning tobacco demand, the upland terraces of the Rice Center were almost certainly timbered and placed under cultivation by the 1630s. Tobacco is extremely detrimental to soil fertility and the yield of any one tract would substantially decline after only a few seasons. By mid-century, many existing plots would have been exhausted, adding to the pressure for additional arable land. When first cleared, most fields would have been left studded with large tree stumps around which the tobacco was planted. Exhausted plots would be quickly be overgrown with herbaceous vegetation of the pioneering succession communities.

As a result, the mid-17th century James River landscape consisted not of orderly farmland, but rather a hodgepodge of active tobacco plots, stump-ridden forest cuts, and weed-choked fallow areas. Housing practices of the time added to the chaotic looking cultural landscape. Most English structures in early to mid-17th century Virginia were of post-in-ground frame construction, clad in split planks with wood and daub chimneys. Early in the period, many of these homes were grouped tightly together and enclosed by a plank fortification to protect against Native American attack. These compounds were devoid of vegetation as a result of trampling by both people and livestock. Areas of level, well-drained soils would have been heavily compacted while lower ground remained wet and muddy during the colder weather months.

The Colonial Golden Age (1700 – 1775)

In contrast to the free-for-all of the 17th century tobacco boom, the Colonial Golden Age of the 18th century brought about more rationalized land use practices along the Lower James River. Over time, prime riverfront agricultural lands had been consolidated within an elite group of property owners who parlayed their holdings into positions of wealth and power. The principal source of much of this wealth remained tobacco, the cultivation and processing of which relied on ever increasing numbers of enslaved Africans.

The Rice Center is situated between the Berkeley Plantation and Shirley Plantation, and historically has comprised the border area between these two prominent James River land holdings. During the 18th century, Berkley and Shirley developed into stately manors replete with formal gardens and elaborately landscaped border areas. These estates were situated to be viewed from the James River, which remained the principal transportation artery of the time. The

surrounding agricultural acreage was carefully managed. These lands also included extensive wooded areas which provided fuel, building material, and mast and other forage for hogs.

The physical condition of the Rice Center during the 18th century is a matter of conjecture. Areas on both sides of Kimages Creek were almost certainly cleared for tobacco cultivation during the boom years the century before. The Western Terrace may have continually been open and in agricultural use from the mid-17th century through the end of the 19th century. The eroded and deflated condition of soils on the landform supports this assertion. By contrast, areas east of Kimages Creek had reverted to forest prior to the Civil War. The abandonment of this land for agricultural use may have occurred as early as the late 17th century. The differential abandonment of Rice Center land to agricultural use was likely due to edaphic conditions specific to the location. Soil exhaustion wrought by tobacco is sure to have been a factor as well. It is hereby postulated that some lands with lesser natural fertility or other negative characteristics, to include the Eastern Terrace of the Rice Center perhaps never fully recovered from the destructive forces of initial clearing and tobacco monoculture. Such areas would have remained in non-agricultural use for the balance of the historic period.

The American Revolution and Federal Period (1776-1819)

The tumultuous events of the American Revolution had relatively little effect on the Rice Center in terms of land use. The area suffered no direct impacts as a result of the conflict. In addition, ownership of land along the James River remained largely unchanged. This is in stark contrast to the Civil War, which resulted in wide scale, destructive, and lasting impacts to the Rice Center and surrounding areas of the Lower James River. It is also likely that the rural, agrarian life ways of the Lower James River remained largely unaltered in the decades following Independence.

The Antebellum (1820 -1860)

Land use along the Lower James River during the first half of the 19th century can be seen as a continuation of 18th century practices. By and large, the local cultural landscape of the 18th century remained intact throughout the Antebellum. On the Rice Center proper, the 1863 Confederate Engineers Map (See Figure 6-2) shows the terrace west of Kimages Creek in agricultural use. Areas east of Kimages Creek are shown as forested. Also shown as forested are the headwater reaches of the unnamed drainage that comprise the western limits of the Rice Center.

While 1863 military map provides a detailed picture of Antebellum land use on Rice Center and surrounding areas of the Lower James River, it also offers a window into the cultural landscape of the times. Clearly expressed on the map is a river-orientated settlement pattern. Major landholdings and associated manors are situated immediately adjacent to the James. Roads are also orientated with respect to the river, emphasizing the continuing central role of water transport. These roads trend from interior areas south toward the river, terminating at a named wharf or landing. In the vicinity of the Rice Center, Kimages Wharf is shown just east of Kimages Creek (See Figure 6-2, Figure 7-2).

Civil War and Reconstruction (1861-1880)

The Rice Center property remained unaffected during the early phases of the Civil War. This changed dramatically in the summer of 1862 when the Army of the Potomac camped at Harrisons Landing following the unsuccessful attempt to take Richmond in the Peninsular Campaign. The eastern side of the Rice Center was cut by a massive earthen fortification line constructed overlooking Kimages Creek. Although the Army of the Potomac remained encamped for only six weeks, the localized environmental impacts of its presence were significant. Some of the disturbances such as the earthen fortification remain to this day. The creek bottom and surrounding areas were clear cut to provide open field of fire for the Union defenders. This may have been the first time that the bottom land along Kimages Creek had been cut. The Western terrace of the Rice Center remained open and in agricultural use at least through the end of the conflict.

Following the Union withdrawal from Harrisons Landing and Berkley Plantation, deep scars were left on the landscape, including the eastern two-thirds of the Rice Center. The massive earthen fortifications constructed along the east side of Kimages Creek remain to this day. Other effects on the land included the denuding of large area in front of the fortifications resulting in extensive erosion (See Figure 7-2 for a period sketch of Kimages Creek). Figure 7-1 in the preceding chapter showing the Union fortifications at Bermuda Hundred is likely an accurate representation of what the eastern third of the Rice Center would have looked like in the later part of 1862.

Dawn of the Modern Age (1881-1899)

After likely having been open since as early as the mid-17th century, the fields on the Western Terrace continued in agricultural production into the Dawn of the Modern Age. However, the very tip of the landform overlooking the James had reverted to forest by the 1880s. The rest of the landform remained open and in active agricultural use. By contrast, the adjoining areas east of Kimages Creek (just outside the Rice Center proper), which had remained forested prior to the 19th century were again cleared sometime after the Civil War. These newly cleared areas appear to have been pressed back into agricultural use. The headwater basin of the unnamed drainage on the west side of the Rice Center was also timbered following the conflict. This latter area may have remained untouched since prehistoric times, only to be timbered during the late 19th century.

Early 20th Century (1900-1929)

At the beginning of the 20th century, much of the Rice Center lands were in the process of reverting to forest. An exception was the central part of the Western Terrace, which was in active agricultural use at least to 1937. During the first decades of the 20th century, the woodland portion of the Rice Center were a mix of new growth pine and immature hardwoods, interspersed by plots of old growth. The forest succession communities that established themselves are assumed to have been significantly different character than those that reclaimed Native American fields and burn areas during prehistoric times. Portions of the Rice Center may have been in agricultural use since the mid-17th century, leaving the soil eroded, deflated and robbed of essential nutrients. As a direct result of these human impacts, the forest succession in these areas

is likely to be slower to progress and the communities less healthy than under prehistoric conditions. In addition, individual tree growth rates can be assumed to have been significantly reduced.

During the 1920s the Kimages Creek valley was again timbered for the creation of Lake Charles. Soil for the dam construction was excavated from along the base of the river bluff along the eastern limits of the property. This excavation left a permanent disturbance on the landscape. The impoundment also created wetlands and fostered the development of wetland plant communities along the upstream end of the impoundment where the lake waters interfaced with the Kimages Creek floodplain.

The Great Depression and World War Two (1930-1945)

The hunt club that was envisioned for the Rice Center property failed during the Great Depression and the property was left untended. As a result, for the first time since English settlement and perhaps earlier, the property was without significant ongoing human alterations such as burning, plowing, field clearing, or timbering. During these years, forest cover on the property grew and progressed, albeit slowly.

Modern Era (1946- Present)

This slow maturation and progression of the forests continued through the modern stewardship of the property. Sometime around mid-century, the agricultural field on the Western Terrace was planted in pine. Not long thereafter, the mature pines on southern end of the Eastern Terrace were selectively harvested, leaving that area in regenerative scrub. The greatest change occurred during the late 1970s when large areas east of Kimages Creek were clear cut and planted in loblolly pine. This clear cutting encompassed both the areas selectively harvested of pine some 30 years prior as well as more mature, hardwood dominated forest. This wholesale removal of a diverse forest community and its replacement soft wood monoculture represents perhaps the most intensive human transformation of the local sylvan environment since the original land clearing for tobacco cultivation during the mid-17th century.

The Present Day Rice Center

In summary, it is clear that land obtained by Virginia Commonwealth University at the beginning of the 21st century is not a pristine natural area but rather bears the cumulative effects of at least 400 years of human land use dating back through prehistoric times. In essence, the Rice Center landscape was by shaped natural and cultural forces that are still operative today. The succeeding Section 9 Summary and Conclusion provides an accounting of how these forces are manifested in the contemporary Rice Center environment. The final chapter, Section 10 Epilogue postulates how this environment differs from what the Rice Center would have looked like had it never been subjected to the hand of man.

Section 9 Summary and Conclusions

Introduction

Section 9 examines the contemporary Rice Center environment in terms of how past human activities helped shape its present day condition. While European colonization of the Lower James River resulted in dramatic changes to the area's environment, Native Americans also left their mark on the land. In a real sense, contemporary landscapes are the product of naturally occurring processes and the sum of human influences that have been exerted upon them. In this context, the section first provides a recounting of land use impacts to the Rice Center property and then frames the present Rice Center environment in terms of lasting human impacts. An end goal is to contrast these existing conditions to what the local environment would have been like had it never been subjected human use.

Review of Human Land Use Impacts

Native American Land Use Impact Summary

Native Americans lived along the James River shores for approximately 11,500 years prior to European contact. Land use impacts associated with the first five and a half millennia of Native American settlement were minimal. With time, Native American populations grew and settlement and subsistence practices became geographically more focused. Beginning around 2500 B.C., Native Americans began to actively modify the local forest environment through the use of fire and by other means. Life ways of this period set the stage for the intensive Native American settlement and associated land use practices characteristic of later times. Native Americans encountered by the first European settlers in Virginia lived in semi-permanent villages supported in part by cultigens, most notably maize. These groups cleared forest to support their crops, abandoning the plots and clearing more areas when soils became depleted. As a result, Native villages were surrounded by patchy woodlands in various succession states. Fire was used to drive game during communal hunts and these activities also significantly influenced the forest character of the time. Rather than destroying the local forest, fire drives tended to clean out deadfall and other litter, while leaving healthy mature trees intact. This likely helped preserve an open, park like character of some terraces fronting the Lower James River.

The overall environmental impact of the Native American land use practices was not insignificant, and these impacts clearly helped shape the landscape of the time. However, these effects were not enduring. Native American use of fire to modify the landscape and the clearing of minor forest tracts amplified ongoing natural processes such as forest storm damage or wildfires. Further, forest disturbance by Native Americans was short lived. Temperate deciduous forests characteristic of Virginia Coastal Plain are highly resilient. Native American horticultural practices did not result in deep soil disturbance and/or erosion characteristic of historic land use. Soil depletion, while a factor at the time, was limited to the surface horizon. Native American fields were essentially no till gardens in which most of the forest humus

remained intact. When left fallow, soil fertility would regenerate within a relatively short period of time. The intensity of this Native American land use reached its peak during the Late Woodland period immediately prior to European contact. Even under these conditions, lands abandoned to Native use quickly transitioned back towards their natural state along a succession trajectory typical for the location.

In less than half a century following European's arrival in Virginia, Native Americans were removed from their traditional lands. In contrast to Native American subsistence practices, the effects of European land use on the local environment were destructive, wholesale, and enduring. These impacts quickly overshadowed, and ultimately subsumed any lingering environmental traces of the Native American's long standing presence along the Lower James River.

While European land use has left an indelible mark on the Lower James environment, including the Rice Center, at least one major manifestation of Native American life remains clearly visible on the landscape. Indians living along the James introduced English colonists to maize, which almost immediately became a survival staple. Maize is of North American origin. It was domesticated from a wild grass-like plant in the Valley of Mexico and genetically altered through a centuries-long process of selective breeding and hybridization. As cultigens, it was ultimately adopted throughout much of Native North America where rain fall and a sufficient frost free growing season allowed it to reach maturity. In a very real sense, the corn fields of Tree Hill Farm, Curles Neck Farm, and other operations along Route 5 represent a direct link to Virginia's prehistoric past and stand as living testament to Native American's manipulation of their natural world.

European Land Use Impact Summary

At first, the English presence along the lower James River resulted in minor, highly localized impacts to the environment. This situation changed dramatically with the onset of tobacco cultivation. Throughout the 17th century, most arable land along the James River shores was cleared of forest and placed under cultivation. The clearing of virgin forest for intensive plow agriculture had immediate and profound environmental consequences. Clearly the most detrimental and lasting impacts were to the soil. These impacts included erosion, deflation, desiccation, the physical disruption of surficial hydrodynamics and critical loss of nutrients. These and subsequent historic land use impacts are sure remain manifested in the present day landscape of the Lower James River, including that of the Rice Center by way of retarded forest growth rates and reduced (native) diversity in forest community species.

Soil erosion precipitated by deforestation and intensive cultivation had immediate and lasting environmental consequences. Sheet wash resulted in the physical removal of soil material across the terrace tops. With this erosional soil loss, the plow blade would cut successively deeper, bringing clayey subsoil to the surface. Repeated plowing also worked to homogenize surface soils, filling in ephemeral wetland and blanketing over minor spring heads along terrace edges. Over time, soil erosion stemming from unfettered land clearing and intensive agriculture throughout the James River watershed increased the sediment load of the river waters and resulted in extensive silting of the river bottom. Erosion along the terrace slopes and sediment loading of stream floodwaters resulted in extensive deposition along minor stream valleys such as Kimages Creek. The addition of fine textured alluvium in these locations created boggy conditions along the floodplain. Another major and lasting impact associated with European

land use was soil nutrient depletion wrought by tobacco cultivation. In some cases, soil degradation coupled with erosion resulting from unwise agricultural practices was so severe that certain areas remain compromised to this day, particularly where natural fertility many have been limited to begin with. By contrast, prime agricultural land along some Lower James River terraces was able to withstand historic tobacco cultivation without lasting detriment. Many of these areas remain in use, producing profitable yields with the support of chemical fertilizer and other modern inputs.

Soil impacts were preceded (and to a large degree precipitated) by wholesale clearing of existing vegetative communities, which at the time were characterized by climax forest interspersed with patchy succession areas. Soil depletion, erosion, plow-induced subsoil upheaval, deflation and compaction is sure to have left a lasting effect on the forest's ability to regenerate. In the face of these significant soil detriments, it is certain that present day tree growth and later stage forest succession rates remain retarded to some degree in some locations.

The cultural introduction of non-native plant species has also left a significant mark on the local environment. Perhaps the greatest impact of non-native plant species has been on the make up of succession communities. Common and pervasive local succession species non-native to the Lower James River area include: multiflora rose *Rosa multiflora* and tree of heaven *Ailanthus altissima*. Pervasive early succession plants include Johnson grass *Sorghum halepense* and numerous golden rod species *Solidago sp.* While the lattermost genus is mostly native to North America many of the nearly 100 identified species of golden rod are recent arrivals to Virginia. Other non-native species remain established in a mature forest setting, often creating a low understory or ground cover totally uncharacteristic of native Virginia forests. The most prevalent of these plants are: common privet *Ligustrum vulgare*, periwinkle *Vinca minor*, and English ivy *Hedera helix*. Interior wetland areas often choked with dense stands of common reed, *Phragmites australis* that crowd out native and ecologically productive emergent species. On the Rice Center proper, common privet and English ivy thrive in places. Both are naturalizing yard/garden species and the latter is particularly prevalent along the very northwest corner of the property.

Other major impacts occurred during the Civil War with wholesale deforestation of the Kimages Creek bottom and the construction of major earthen fortifications. Some parcels of land that had been allowed to revert to forest sometime after the 17th century tobacco boom were again cleared in the late 19th century. The greatest physical alteration of the Rice Center property occurred with the construction of the Lake Charles impoundment. The presence of the lake strongly influenced ground water table and stream gradient well upstream of the normal pool level. The soil material for the dam was removed from the bluff face near the mouth of Kimages Creek, resulting in significant physical disturbance in that area. The Kimages Creek valley was also timbered during that time. Additional soil erosion and compaction accompanied the use of the property as a YMCA camp in the years following World War Two. These compacted areas clearly show as areas of sparse and differential vegetation on contemporary air photos. In the late 1970s, a large swath of land east of Kimages Creek was timbered and planted in loblolly pine. While all of the Rice Center is certain to have been cleared and subsequently allowed to reforest at least one time during the historic period, this reforestation is assumed to have occurred naturally and thus the succession stages and resultant communities largely mirrored the natural regenerative processes,

albeit perhaps at a reduced rate. By contrast, the uniform pine stands on the Eastern Terrace represent a purely culturally-shaped forest environment.

The Contemporary Rice Center

Most, if not all historic period impacts to the Rice Center remain expressed in the contemporary landscape in some way. Recent impacts such as the construction of the Lake Charles impoundment represent a defining feature of the present day Rice Center. The Civil War fortification and the borrow excavation for the earthen dam also remain visible. Other traces of past land use are more subtle. The footprints of the YMCA camp buildings remain discernible as areas of compacted soil and retarded vegetation growth. Other lasting evidence of past human activities includes the effects of erosion associated with wholesale land clearing. This erosion resulted in severe deflation of the terrace tops. The accretion of soil along the stream bottoms from sheet wash and alluvial deposition blanketing features such as low alluvial terraces and minor levee features, transforming these areas into boggy wetlands.

Most of the Rice Center is wooded. However, these forests bear only a partial resemblance to fully natural conditions. The east side of Kimages Creek is in planted loblolly. Uniform age, single species pine forests rarely, if ever occur without modern human intervention. The forest on the west side of Kimages Creek closest to the river appears to have regenerated naturally beginning sometime around the turn of the 20th century. The center of the terrace remained in cultivation through the late 1930s but is suspected to have been abandoned for agriculture a short time afterwards. Hardwoods are dominant in this area, with pine occurring as a minority species. This community is well short of a climax state. The forest is crowded with intermediate growth trees and understory remains relatively fairly dense and well developed.

The character of the forest is also likely to remain affected by past human activity. Soil exhaustion, erosion/deflation and compaction are certain to negatively influence tree growth rates, and to some extent, the forest community make up. Human influence is also seen in the introduction of plant species that are not native to the area. Many of these species thrive under local conditions and compete heavily with native plants.



Figure 9-1 Contemporary Rice Center Showing Lasting Land Use Impacts

The above contemporary air photo of the Rice Center clearly exhibits evidence of land use impacts and modifications that persist through the present day. The most obvious cultural feature consists of the Lake Charles impoundment. Also visible on the air photo are areas of differential vegetation that mark the footprints of the former YMCA camp structure locations. The foot print of a more substantial structure location, is evident on the bluff just upstream of the Lake Charles dam. The extent of the area downstream of the lake planted in pine clearly shows in the air photo. Also evident are the road traces on the property.

Lasting impacts to the Rice Center environment resulting directly and indirectly from its human use are listed below. These impacts remain visible or are otherwise clearly expressed in the contemporary Rice Center environment.

1) Erosion Effects of Associated with Historic Land Clearing

- Slope Wash and Formation of Colluvial Aprons at Base of Uplands
- Increased Alluvial Deposition along Stream Bottoms
- Increased Calving and Slumping of Bluff Face

2) Physical Alterations to Soils

- Historic Plowing and Agriculture
 - Soil Erosion and Deflation*
 - Soil Nutrients Loss Associated with Unwise Agricultural Practices*
 - Loss of Deep Forest Humus*
 - Homogenization of Surface Soils*
- Compression by Vehicles/Buildings and Trampling
 - Soil Compaction*
 - Increased Runoff*
 - Retarding of Vegetative growth*

3) Landform Disturbance/Contouring

- Construction of Massive Civil War Earthworks
- Historic and Modern Road Construction
- Construction of Lake Charles Dam and Associated Soil Excavations

4) Direct Botanical Alterations

- Introduction of invasive plant species
- Creation of a pine monoculture

5) Hydrological Alterations

- Lake Charles pool and associated near surface and ground water impacts
- Increased run off stream flow during storm events resulting in bank erosion, down cutting and channel incision.
- Degradation or loss of ephemeral wetlands and spring locations
- Increased turbidity and sediment loading of James River and tributaries
- Redirecting Kimages Creek below dam and attenuation of channel flow resulting landform changes along the original James River confluence.

In short, even though at first glance much of the Rice Center may look like a purely natural environment, a detailed analysis reveals pervasive and lasting impacts brought about by human use. This use has left the local environment with a character appreciably different than a natural state. In this context, the final section postulates what the Rice Center would actually look like had humans never arrived on the Lower James River shores.

Section 10 Epilogue

The Rice Center That Might Have Been

As detailed in the previous section, the Rice Center of today is very different than had it never been subjected to human use. In the pluperfect, one can imagine a Rice Center forested by majestic stands of mature hardwoods that form a high, dense canopy. The forest floor is thickly blanketed with organic detritus and deep humus, but mostly free of undergrowth. However, the forest floor is far from homogenous. In places, seeps and ephemeral wetlands is signaled by scattered occurrence of ferns and other hydrophilic growth. Diversity reigns in the canopy as well, with a balanced mix of upland tree species, each having established themselves and staked their place in the forest over a long period of time. Occasional gaps in the canopy occur around standing dead trunks or where trees have fallen. An explosion of growth occurs any place where light streams through to reach the forest floor, particularly around tree falls. With time, the decay of fallen trunks provides a rich bed for fungal growth and insects as the canopy overhead begins to close. This canopy is comprised mostly of oak and other hardwoods including hickories. However, white oak dominates the uplands, both in number and stature. Mature pine trees are limited to the terrace slopes; locations where they can resist the relentless push of their deciduous brethren to crowd them out of existence. These pine trees look nothing like the cultivated stands of today's Rice Center. The massive loblollies soar well over 100 feet in the air, their long straight trunks five feet or more in diameter. Even more massive yellow poplar trees thrive along the moist, sheltered cove of the stream bottom, together with scattered groups of beech and white oak. Red maples seek out niche areas of bottomland and stream margins where their shorter stature still allows them to capture their share of life sustaining sunlight.

Kimages Creek winds its way along the valley floor covered in a cathedral-like canopy high above. These waters run clear as they pass over sand and cobble beds, slowing intermittently to collect in deeper pools. The stream follows gentle meander bends flanked by stable, sloping banks. The mouth of Kimages Creek opens to the James with the widening channel bordered by shallow flats. A web of aquatic grasses thrive the clear water shallows. These grasses help keep the waters free of most suspended sediment and a sand and gravel bottom is visible well below the James River surface. Beyond the shallow bay at the mouth of Kimages Creek, the bottom drops to the first submerged channel, darkening of the water's hue. Stands of bald cypress line the protected shore along the mouth of the creek. This area hosts rich and diverse wetland communities. Emergent and underwater vegetation keep wave action and storm tides in check. As a result, the James River shore line is comprised of fine, well sorted sands. The occasional remains of a massive tree are seen jutting from the water, toppled from along the bank by erosion brought on by the estuary waters slow and an ongoing rise through the millennia. Otherwise, the high tide line is only sparsely littered with drift wood and other organic debris. Beyond the shore, the vista of an unspoiled James River beckons a wide open view.

The Rice Center That Might Be

As recounted in this work, the Rice Center and its Lower James River setting have experienced profound physical and environmental transformations over the last 11,500 years. Initially, these changes were forged by post-Ice Age climate shifts and resultant rise in sea level. However, man has played a role in shaping the local environment since Native Americans first arrived on the James River shores. Native American environmental impacts increased significantly around 5,000 years ago with the advent of Late Archaic period settlement and land use practices. Prehistoric peoples continued to impact the local environment until the arrival of Europeans in the early 17th century. The early colonial period witnessed wholesale land clearing for tobacco cultivation. This was followed by three centuries of intensive agricultural use of the lands fronting the Lower James River shore, including portions of the Rice Center property.

Now, as the 21st century begins, much of the land comprising the Rice Center has remained undisturbed for decades. Human impacts, while enduring are not permanent. With time the land will heal. Left undisturbed, the forests of the Rice Center will slowly transition towards their natural, climax state.

In the short term, the homogeneity of the loblolly pine forest on the east side of Kimages Creek will fade. As the pine forest matures, individual loblollies give way to deciduous species. Soon, new hardwoods grow to crowd out the older pines. Before long, the mixed forest gives way to one comprised of mature hardwoods, with pine occurring in areas newly disturbed by wind, fire or disease. The Rice Center of the future will have stately hardwood trees with tall, dense canopies that darken the forest floor, effectively suppressing undergrowth. Inevitably, individual trees succumb to age or disease or weather, leaving a gap in the canopy and triggering the natural drama of localized forest succession. Light streaming onto the forest floor triggers a rush of new growth by pioneering plant species, the seeds of which are spread on the wind or by birds. Within a short time, the forest floor hosts a diverse, early succession community. A single sapling, lucky enough to have established itself on the spot around the time the mature tree succumbed, seizes the opportunity and grows rapidly towards the light streaming in from overhead. The sapling must out compete numerous others to reach its place in forest canopy, as in the end there is room for only one. As that single tree edges its way into the canopy break, the forest floor darkens once more. This process occurs repeatedly across the Rice Center terraces, resulting in a patchy mosaic of rich succession communities interspersed within expanses of mature woods. Over time, the thick forest humus fully rebuilds. Bacteria and fungi continually break down the deadfall, creating a reservoir of nutrients essential for the sustainment of a healthy climax forest ecosystem.

The above scenario is predicated on the assumption that future climate conditions will be similar to those of today. This is by no means a safe assumption. The specter of man caused, or man enhanced global climate change must be considered in any projection of future environmental conditions. Climate change could profoundly affect not just the polar region and semi-arid zones near the tropics (areas with environments that are highly sensitive climatic shift) but also the mid-latitudes including the United States Mid-Atlantic, whose temperate deciduous forest environments are comparatively resilient. Even if one accepts only low to mid-range predictions of global climate change, then the Rice Center of the future may look very different than today. Although actual projections of environmental impacts wrought by climate change are out of the

scope of this study, it is safe to say that the future may bring droughts severe enough to radically stress local forests. More frequent storms and wind damage can also be anticipated. Together with mild winters and uneven precipitation, this is likely to increase the severity of insect infestations and disease outbreaks, leading to further stress on local forest ecosystems.

In the longer term, accelerated sea level rise may bring even more significant changes to the Lower James River. Melting of the polar ice caps and Greenland glaciers will bring on a renewed period of rapidly rising sea levels. Lower terraces along the river will be inundated, while rising waters begin backing into smaller drainages, turning them into tidal arms of the James. The Rice Center uplands are situated well above any foreseeable sea level. However, the base of the terraces will be impacted by the rising waters. Storm tides and wave action erode the base of the bluffs, causing extensive calving and slumping of bluff soils. Under these conditions, Lower James River terrace bluffs show their exposed faces. Soil and gravel accumulate at the base of the terrace to be reworked by wave action. This material forms the basis of expansive near shore flats and bars that lie exposed during low water and dry conditions, potentially triggering a renewed period of aeolian soil movement/formational processes along the James River shores. Together, these forces will act to bring physical, hydrological, chemical, and significant biological and ecological changes to the Lower James River estuary and its adjoining terrestrial environments.

Final Thoughts

The stated goal of this study is to provide a reconstruction of the Rice Center through time, concentrating on the environmental impacts of human land use over the last 11,500 years. In articulating the findings, the author has attempted to convey to the reader a sense of dynamism inherent to our environment--what was in the past, is not what is today, and is not what will be tomorrow. Moreover, perhaps the most important lesson is that we as humans have long exerted significant and lasting impacts on our surroundings. Further, these impacts extend well beyond the obvious cultural alterations to the landscape that we recognize every day. Seemingly “natural” areas such as the woods, river banks, and stream valleys of the Rice Center bear the indelible mark of the human hand. These areas, though appearing outwardly undisturbed, look significantly different than they would have had humans never arrived on the James River shores.

In the study, the author has also attempted to give equal weight to Native American land use and land use impacts as to those brought on by European settlers and their American descendents. Native American impacts, while far less severe than those resulting from European land use, were not insignificant. These impacts, however, are far more difficult to chart. Not the least reason is that the devastating environmental consequences of the colonial land clearing and tobacco monoculture followed by at least 200 years of intensive and often unwise land use practices all but obliterated the environmental traces of Native American presence. In light of this, when attempting to reconstruct the Rice Center through time, the author felt it critical to look at the sum of all of human influence on the land, and not just those impacts that remain obvious to the present day.

Even with the environmental devastation brought on by European settlement and centuries long presence, it is perhaps possible that Native American influences on the contemporary environment remain, and that these traces lay hidden in plain sight. The term land use “impact” carries the negative connotation of damage or destruction. However, could it be possible that the nearly 11,500-year presence of Native Americans along the Lower James River remain manifested in environmentally positive ways that we fail to recognize? In 1998, the author co-directed a major archaeological excavation on a large Native American site overlooking the St. Jones River on the outskirts of Dover, Delaware. The Hickory Bluff site (Petraglia 2002) had been intensively re-occupied from the Late Archaic (ca. 1,500 B.C.) through much of the Middle Woodland (ca. A.D 600). A unique attribute of the location was that unlike virtually 100 percent of level, well-drained terrain on Delmarva, the site had never been subjected to historic plowing. Another striking aspect of the Hickory Bluff setting was the large and majestic trees that gave the site an open, park-like character. Present within the relatively limited project area was a broad cross section of tree species representative of central Delmarva sylvan communities. Tree ring counts performed by the author following the site’s clearing for highway construction indicated that many of the individual trees had experienced rapid, sustained growth rates to reach a significant size within a relatively short time span. A fully unique aspect of the site was the presence of bald cypress along the St Jones shores, which lie more than 50 miles beyond the generally recognized northern limits of that species’ present day range.

Persons visiting the site were impressed by the size, diversity, and apparent health of the open forests on Hickory Bluff. These visitors included members of the contemporary Delaware Nanticoke Lenape Tribe who came to feel that the location had been significant in their peoples’ past. This assessment was based as much on the environmental character of the setting as it was on the rich archaeological remains being investigated. At the end of the excavation, the author was invited by the Nanticoke Lenape to participate in a full sweat lodge ceremony to consecrate the site prior to its destruction for the start of highway work a few days later.

Participating in an intensive Native American ritual and listening to Native American views on their history and relationship with the environment prompted this author to reassess his conceptions of Native American land use (Egghart 2006). One began to question whether the environmental character of the Hickory Bluff was due solely to natural edaphic conditions, in addition to the location never having been subjected to the destructive forces of wholesale land clearing and plow agriculture. Alternately, could the positive effects of Native American settlement of Hickory Bluff actually be manifested in the contemporary local environment? Perhaps the ongoing addition of plant/animal remains and human waste over two millennia resulted in elevated soil fertility that persists to the present day. It is also possible that the actual Native American stewardship of the Hickory Bluff environment left a lasting positive impact. As a site intensively reoccupied over a long period of time, Native Americans may have deliberately favored the growth of individual economically valuable trees such as those with high mast production, by killing and removing lesser, competing specimens. Over time, this could work to genetically enhance the local forest communities. As unusual as this idea sounds, one only has to look at the produce section of any supermarket, or view the corn fields prominent in the regional landscape, to see direct living evidence for Native American manipulation of plant genetics. If any positive effects of the long term Native American use of the Hickory Bluff site

actually remained in the local environment, similar traces could be present in other areas, including the Lower James River. The challenge may lie in recognizing such traces.

In conclusion, it is the author's hope that by using the Virginia Commonwealth University Walter and Inger Rice Center for Environmental Studies as a case study, the endeavor has succeeded in underscoring for the reader the dynamic nature of local environments, as well as highlighting the role that we as humans have long played in shaping those environments. After being subjected to centuries of human impacts, the Rice Center lands are now preserved in perpetuity. As such, the tract presents an ideal opportunity to study and document, in the long term, how environments that have been heavily impacted by humans, recover to begin their long transition back towards their true, natural states.

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